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DATES AHEAD.

Missouri Electric, Gas, Street Railway and Water Works Association, St. Louis, April 13, 14 and 15.

Third Annual Meeting, Pennsylvania Gas Association, Reading, Pa., April 12, 13 and 14.

Third Meeting, Southern Gas Association, Montgomery, Ala., April 19, 20 and 21.

Seventh Meeting, Southwestern Electrical and Gas Association, Houston, Tex., April 27, 28 and 29.

Annual Meeting, Wisconsin Gas Association, Milwaukee, Wis., May 17 and 18.

[Special Editorial Correspondence.]

SEVENTH MEETING, ILLINOIS GAS ASSOCIATION.

AUDITORIUM HOTEL, CHICAGO, ILLS., March 16, 1911.

Dear JOURNAL: The beef-and-vaudeville entertainment is just at an end, and in ample time to send you a "night letter" account of the proceedings of the first day of the Seventh Annual Meeting of the Illinois Gas Association. By way of preliminary, let me write that the weather conditions were perfect, the attendance (over 150 are here) large numerically and mutually ebullient, the men in charge of affairs alert, resourceful and laudatory. In fact, everything was and is as it should be. No time was spent this morning in being "welcomed to the city," etc. President Harrington (and a competent director he proved himself) took the directing place, Secretary Strohn assumed the reader's chair, the members found suitable seating accommodations, and promptly at 10 the gavel fell, the call to order was spoken and themeeting was under way. Naturally, routine business led the regular order. The reports of the Board of Directors and of the Secretary-Treasurer bespoke the smoothness with which the ordinary business routine of the body was being conducted and how satisfactory its financial condition was. These things properly disposed of, the paper list was taken up. The first number considered was the communication from President Harrington, whose inaugural message had chiefly to do with matters mainly concerning the Association and its progress. Two or more of its paragraphs, however, had to do with other things, notably the introductory one under the subhead of "Manufacture." This seems well worth while reproducing here, in that its thought may be given due heed by the several classes of "engineers" now finding top notch places in the industry. President Harrington's introductory was: "The statement has been made on different occasions that the engineer following this particular branch of our business—*i. e.*, gas production—is not as important a factor as he was years ago; but I will have to take issue with him, as perfection, or anything near its approach, has not yet been reached in any of the different processes of gas manufacture, although higher proficiency and new thought are developing every day." Well said, President Harrington. The first paper considered was that by Mr. J. C. Markley, whose well arranged presentation of the "Chamber Oven Process of Coal Gas Manufacture" was rewarded with a brisk discussion. That this topic is taking on added interest (especially in the Middle-West) is more apparent every day. The second paper was that by Mr. A. F. Blossey, on "The Operation of an Ammonia Still." Its reading was followed by the report of the Nominating Committee, who recommended the named gentlemen as office bearers for the ensuing year—it is needless to add that the recommendations were subsequently indorsed with a royal manifestation of good will.

For President.—Mr. C. B. Strohn, of Elgin.
For Vice-President.—Mr. R. C. Dawes, of Chicago.
For Secretary and Treasurer.—Mr. H. E. Newberry, of Kankakee.
For Director (2-year term).—Mr. A. E. Hartman, of Joliet.
For Delegate to Am. Gas Inst.—Mr. A. S. Harrington, of Chicago.

This terminated the morning session. The afternoon deliberations were opened with the paper by Mr. S. C. Heath on "The Utility of the Pyrometer on Carburetted Water Gas Machines," which was well received, and it was timely, too, in that the use of the instrument, as necessary to advanced water gas making, is pretty well established. The paper by Mr. Lester Price, on "Utilization of Gas for Domestic Purposes in Suburban Localities," gave the "Commercial Engineers" an excellent opportunity to play their innings; and it is needless to say the opportunity was availed of to its fullest. It might be added here that the Association very wisely decided to increase substantially the "emoluments" of the incumbent of the position of Secretary.

The beefsteak dinner, well seasoned with an excellent vaudeville entertainment, closely held the attention of the members and guests between the hours of 7 and 10 30. 'Promptu speeches were tabooed, but of the impromptu variety there were many. In fact, the broad spaces of the excellently appointed hall of the Chicago Athletic Club never resounded the merrimental glee of any makers in greater volume than we had record of this time. Everything was harmonious and happy, in support whereof the doubter is referred to our only "Jim" T. Lynn and the other 209 present.—C. H. W.

AUDITORIUM HOTEL, CHICAGO, March 17.

Dear JOURNAL: The closing day of the meeting was quite as the first day. A beautiful spring day was granted us by the lion-like month. The attendance continued fully up to the high mark of Wednesday, and that interest was well maintained was shown in the presence of those who shared in the techcical work. The business of the day was begun with the paper by Mr. J. H. Roemer, who forcibly presented in varying phase "The Causes and Effects of a Public Utility Commission." This paper aroused a spirited discussion, in which it was small wonder that the Chicago men took active part, for is not that perpetual civil job hunter, Carter Harrison, contesting again for the Mayoralty of the big Western city, on a platform the rottenest plank of which demands gas at 70 cents per 1,000. In this debate or expression of opinion Mr. H. L. Rice especially shone, and his ultimatum was that higher rather than lower prices for gas should prevail in the Western metropolis, if the rights of gas shareholders were to be given any heed whatever. The paper, by Mr. N. D. McPhail, on the "Prevention of Accidents," was a well set forth presenting of some homely but nevertheless interesting ways to follow in the accomplishing of so laudable an object. The short afternoon session was occupied with a consideration of the paper, by Mr. R. N. Davis, on "Steam Economy in Gas Plants," and that by Mr. J. Dewey, whose clear-cut describing of the "Industrial Application of Gas" was well received. A very pleasing incident of the meeting was an address by President Burt, of the Iowa Association, whose general invitation to the Association that the members assemble with them in the convention in Clinton next May was hailed with acclaim. Another of the pleasantest incidents of the session was the court paid to Uncle "Jerry" Howard, who celebrated the 81st recurrence of his natal day on the closing day of the meeting. Dear, beloved old veteran that he is, no one can truthfully gainsay that, if appearance and activity count for aught, he will surely be on hand to witness the coming of age of that lusty youngster, the Illinois Gas Association.—C. W.

BRIEFLY TOLD.

THE MEETING OF THE SOUTHERN GAS ASSOCIATION.—This juvenile amongst the gas associations, considering priority as being the determiner of age, seems to be of the lusty sort, for the youthful body is proposing for its next meeting (Montgomery, Ala., April 19, 20 and 21) a series of sessions seldom put up by its older contemporaries. The technical part of the proceedings is being well taken care of, in that the set papers—all on live topics—will number no less than 11, and the preliminaries regarding the social side are surely on a lavish scale. The Executive Committee, at a meeting held in Montgomery the second week of the month, went over the situation in much more than tentative degree, and as a result of the deliberations we may announce that those who will attend are to have something of this nature confronting them. The business sessions will be disposed of in 2 days, and the third one will be given over to an outing to be held in Jackson Park, a noted suburban resort some 8 miles out from the city, where a barbecue, in the Southern style, will be brought off. No less a person than the internationally famous Colonel Mahoney will direct the "barb.," and he will do so to musical gems sounded by the instrumentists of the noted band of the First Cavalry. The Jackson Hunting and Fishing Club has, with true Southern hospitality, turned over its Club House to the Association for the day in question, and those who later on, or when the shadows deepen to dark, would indulge in the delight of Terpsichore, will find ample space and tune to develop their best paces. A "Smoker," with current vaudeville enlivening, is also on the programme. While the executives have been busy in the arranging, it is nevertheless an open secret that Mr. C. E. White, the bustling, successful General Manager of the Montgomery Water, Light and Power Company, is the one whose diligence in respect of all this preliminary is most to be credited. For courtesies in this connection we are indebted to Mr. Jno. F. Parker.

NATIONAL COMMERCIAL GAS ASSOCIATION HANDBOOK.—"A gas solicitor who carried with him even part of available literature would look like a book agent." The above remark, made by one of our prominent commercial men, is in itself reason enough for the adoption of a handbook. As a matter of fact this modern, high efficiency method of handling printed matter will obviate troubles other than those of appearances. The solicitor will always have at hand a somewhat complete and handy reference concerning the details of the appliances which will help to refresh his own memory as well as place the matter attractively before his customers. We understand that the larger companies have, or will shortly adopt the book, and among these may be mentioned the Consolidated, of New York, the U. G. I., of Philadelphia, the Public Service, of New Jersey, and the Susquehanna Railway, Light and Power Company. All that remains now is for the manufacturers to furnish the data, and this no doubt will be forthcoming as soon as requests are made upon them for it.

MARCH MEETING, NEW JERSEY SECTION, N. C. G. A.—The March meeting of the New Jersey Section of the National Commercial Gas Association was held on the evening of the 9th inst. in the assembly room of the Public Service Building, Newark, N. J. The topic selected was a paper prepared by Messrs. Mercer, White and Wheelihan, of the Hudson Division of the Public Service Gas Company, the title being "The Relation of the Bookkeeper to the New Business Department." Some 250 men were present and the discussion was live and interesting.

Publications.

Permissible Explosives.—Miners circular, No. 2; 6 by 9; 12 pages. Prepared by Mr. Clarence Hall and issued by the Bureau of Mines. Contains considerable data, and a page or more of "don'ts." Those living in Greater New York have reason to remark concerning the "don'ts" in respect to dynamite.

Smithsonian Institute, Annual Report, 1909: The report contains a number of important contributions, and its slogan, "For the increase and diffusion of knowledge among men," has certainly been lived up to in the 750 pages of the present volume.

Pyrometers.—Catalogue of electrical pyrometers. Thwing Instrument Company, Philadelphia, Pa. Descriptive catalogue covering Dr. Thwing's Pyrometer and other measuring instruments.

Glassware.—"Inverted gas illumination" catalogue. Phœnix Glass Company, 13 Murray street, New York. A complete line of both decorative and utilitarian glassware for inverted gas lamps. A buyer would be hard to please who could not make a selection from those illustrated.

Brass Goods.—Catalogue, The McRae & Roberts Company, 225 Campbell avenue, Detroit, Mich. Cocks, burners, etc., for ranges and industrial appliances; fully illustrated.

Gas Arcs—Folder, United Gas Light and Manufacturing Company, 378 3d avenue, New York. "Sunshine's greatest rival," the Cody Gas Arc, illustrated and described.

Magnetos.—The 1911 Catalogue of C. F. Splitdorf, covering magnetos of their manufacture. The catalogue includes full instructions for installing and operating.

Baltimore Bulletins.—Lamp and range circulars in color, issued by the Baltimore Consolidated Company. The high standard set in their recent publications has been kept up in these circulars. Commercial men should get on their mailing list.

The Indicator.—Catalogue of Schaeffer & Budenberg Manufacturing Company, Brooklyn, N. Y. This company manufactures a full line of precision instruments covering pressure, temperature and speed. The 1911 catalogue is handsomely illustrated and contains descriptions of the use of the various instruments.

Gas News.—A 4-page folder issued monthly by the Consumers Gas Company, of Toronto, Canada. The items selected by editor Geo. W. Allen, for the month of April, are of timely interest and offer many suggestions which should increase both the goodwill and the business of the Company.

Graphite.—Monthly bulletin, Joseph Dixon Crucible Company, Jersey City, N. J. An attractive "house organ," containing illustrated articles and other matter pertaining to the products of the Company.

[Communicated.]

The Decision of the Railroad Commission of Wisconsin in the Racine Case.

On January 27, 1911, the Railroad Commission of Wisconsin handed down its decision, in the case "City of Racine *vs.* Racine Gas Light Company," and as some features of the case, together with some points in the decision that are decidedly distinguishing, these will doubtless be of considerable interest generally.

The Racine Company manufactures and sells coal gas to approximately 7,000 consumers, besides supplying the Kenosha Gas and Electric Company (since 1907) with an average of over 70,000 cubic feet per day for distribution by that Company among its consumers in Kenosha. The Racine and Kenosha Companies are under a common ownership.

The gas business in Racine dates from 1867, when a small gas plant was built, serving only a few consumers through a small system of wooden mains. The population of the city at that time was apparently in the neighborhood of 9,000, and has grown to 38,002 (U. S. Census, 1910). The original plant is no longer in existence.

The gas business in Racine was never well developed until after the property passed into the hands of the present owners, which transfer occurred about July 1, 1899. Since that time the aggressive campaign conducted by this Company for development has resulted in large annual increases in numbers of consumers and total sales, until now it has about 67 miles of mains (exclusive of the 6-inch high pressure line to the north limits of Kenosha, about 10 miles in length) and 7,000 cons umers, and delivers to its mains about 232 million cubic feet per year, the average daily production being not far from 626,000 cubic feet. The total earning from the sale of gas and residuals for the last fiscal year was reported as $273,936.51, while total operating expenses, exclusive of interest and depreciation, amounted to $177,696.06.

The gross rates charged by the company have been as follows, per 1,000 cubic feet, the same being subject to a discount of 20 per cent. per 1,000 on bills paid on or before dates specified in the bills:

Regular Local Customers.—On illuminating account, any quantity, $1.40 per 1,000.

On fuel account: First 10,000 cubic feet, $1.20; next 20,000, $1; all over 30,000 cubic feet, 80 cents.

Interurban Customers.—On illuminating account, any quantity, $1.70 per 1,000 cubic feet; on fuel account, first 10,000, $1.20; next 20,000, $1; all over 30,000 cubic feet, 80 cents.

Special rates apply to the service furnished to the U. S. Government, the city of Racine at large, and the Kenosha Gas and Electric Company. The latter pays the Racine Company 50 cents per 1,000 cubic feet for gas delivered to the Kenosha mains at the north limits of that city. This rate is embodied in a contract made between the two Companies in 1907, at a time when the growth of the gas business in Kenosha rendered it necessary to either obtain an auxiliary supply from outside or enlarge the Kenosha plant, including its holder capacity.

The present Racine plant is on the shore of Lake Michigan, at or near the mouth of the Root river, where it was built in 1900. All of the present buildings, and the 400,000 cubic foot holder, were built at that time, but the capacity of the manufacturing equipment then installed was only about one-half the ultimate capacity of the plant as planned. It included 2 stacks of 5 benches of 6 retorts each, having a capacity of 500,000 to 600,000 cubic feet, with exhausters, condensers, scrubbers, purifiers, etc. About 1904 an additional stack of 5 benches was installed and additional condensers put in. In 1907 and 1908 a new holder of 1,000,000 cubic feet capacity was erected and the 10-mile pipe line to Kenosha was laid.

The case in question was brought before the Railroad Commission, under the Wisconsin public utilities law of 1907, in the filing, by the city of Racine, of a petition and complaint which alleged, among other things:

1. That the said Racine Gas Light Company furnishes but one quality of gas, which is used for both fuel and lighting purposes.

2. That the consumers are compelled to rent two meters, one registering the amount of gas used for fuel, the other the quantity used for lighting purposes.

3. That two rates are charged by said Company, the rate for lighting purposes being $1.20 net per 1,000 cubic feet; the rate for fuel purposes being $1 net per 1,000 cubic feet.

4. That from a comparison of rates charged by other companies in different cities of the State for gas, and, taking into consideration the advantages which the Racine Gas Light Company have by way of shipping facilities, and the large quantity of gas manufactured and sold, the complaint alleges that the rates charged in the city of Racine by the respondent Company are excessive and unreasonable.

5. That many complaints have been received by the city authorities from consumers of the respondent Company in regard to the accuracy of the meters used for registering the amount of gas consumed by said consumers, and that from a test made by an expert in the months of July and August, 1907, it was found that 75 per cent. of the total numbers of meters so tested were running fast.

Setting forth the complaints as above stated, the petition then asked that the Commission order the respondent Company—

1. To lower its rates for gas in the city of Racine.

2. To furnish meters which will accurately register the amount of gas consumed.

3. To charge but one rate for gas consumed, whether it be for fuel or lighting purposes.

Valuation of the Property.—Under order of the Commission a tentative valuation of the physical property of the respondent Company was prepared and submitted by the Commission's engineering staff. This valuation was, as usual in such cases, based upon normal costs of material and labor, rather than upon the ruling prices of that time, as explained in the decision of the Commission in "City of Appleton *vs.* Appleton Water Works Company," 5 W. R. C. R., 228–235. (See *Engineering News*, June, 16, 1910.)

The final summary of the staff's tentative valuation of the Racine property is as follows:

Tentative Valuation of Physical Property.—Final Summary Report of Engineer to Railroad Commission of Wisconsin.

Group.	Classification.	Cost of Reproduction.	Present Value.
1	Land	$ 42,250	$ 42,250
2	Intake	549	544
3	Holders	127,898	125,197
4	Distribution System	378,498	344,131
5	Plant Equipment	124,359	107,221
6	Buildings and Miscellaneous Structures	82,624	70,260
7	Office Furniture and Appliances	3,770	3,940
8	Tools and Instruments	9,037	6,476
9	Horses, Wagons and Miscellaneous	5,645	4,075
	Totals, Items 1-9	$774,630	$703,994
10	Add 12 per cent.	92,956	84,479
	Totals, Items 1-10	$867,586	$788,473
11	Stores and Supplies	40,630	40,516
	Totals, Items 1-11	$908,216	$828,989
12	Paving	27,794	26,404
	Totals, Items 1-12	$936,010	$855,393
	Real Estate held but not used in Company's Business	15,370	15,370
	Grand Totals	$951,380	$870,763

Following the making of the above valuation, notices were issued and hearings were held by the Commission, in its office at Madison, on the matters of the valuation and rates. Both parties in the case were represented by attorneys and both produced witnesses who testified on various phases of the issues. Among the witnesses for the petitioner were Messrs. Alton D. Adams and P. H. Connolly, the latter being City Engineer of Racine.

Petitioner contended and sought to show that the tentative valuation made by the staff included some items which should have been excluded entirely, and other items which should have been excluded in part; further, that the valuation of still other items was excessive.

Respondent sought to show that the values placed by the staff on some parts of the property were too low, and that the report failed to include several elements which should be considered in determining the value of the plant as a whole for rate making purposes. The decision in the case contains a full discussion of all the disputed items and indicates that the Commission was not shown that the valuation made by the tariff was materially in error on any point except on the matter of paving. The tentative valuation, modified as to paving, was used by the Commission in its analysis of the case.

Attention is here called to the reasons for the substitution of other figures for paving. The engineering staff, in making its valuation, took into consideration all paving which would necessarily be disturbed and replaced in the assumed reproduction of the property. It did not include the old and worn out cedar block paving, and did not have any reference to the amounts of paving of the several kinds which had actually been disturbed and replaced by the Company in the course of its construction work. The latter question was subsequently investigated by the staff and a supplementary report covering

the matter was made to the Commission. This report showed that $3,444 appeared to fairly well represent the paving expense to which the Company had been put. Following out principles laid down in earlier decisions, involving the question of paving costs, the latter figure was substituted by the Commission for those in the tentative valuation.

Reasonableness of Investment.—Petitioner contended strongly that the respondent Company had made the mistake of building up a plant and system much too large for the business of either the present or the near future and insisted that the Company's consumers should not be burdened in the rates with the capital charges on the entire investment.

On this point the Commission says, "It is at once apparent that any opinion as to the question of over-investment in any business where such over-investment, if it exists, will so largely affect the matter of rates, cannot be based upon anything but a most careful and thorough investigation. Such an investigation was made in this instance. The investigation has extended over a considerable time and has covered every phase of the Company's past growth and probable future development, and has covered a study of the Company's property and plant from the production end to the distribution and supplying of consumers."

The investigations alluded to were conducted by the engineering staff and the full text of the staff's report is embodied in the decision. As the report alone fills 47 typewritten pages of legal size, it will be apparent that only a synopsis can be given herein.

The report begins with a discussion of the general features of the manufacturing plant, particularly the equipment, in the light of the practical considerations influencing the design of the original plant and the making of extensions to the same as needed, and the ordinary economies of investment which may be made or forfeited. A number of instances of conspicuously faulty design in the plant as it exists are pointed out. In reference to the condensers it is said, "There is, however, one fact which should not be lost sight of. The depreciation of condensing machinery is largely independent of the amount of gas manufactured, provided the equipment is in use constantly or even periodically. The gases passing are very corrosive and the corroding action is largely proportional to the time exposed and not to the quantity passed. This renders it inadvisable to provide condensing capacity greatly in advance of the need for it. When the Racine Company had just about reached the capacity of the condensing system they immediately built the largest condensing system which they could get into the building, with a capacity which, as a matter of fact, they will not require during the life of the original 600,000 installation. The reason given for installing this capacity was it was bought cheap, but it appears that interest and depreciation within 3 years counterbalanced the effect of the bargain. An additional condenser and one additional scrubber of the size included in the second installation would have met the requirements up to the present and would have saved interest and depreciation on about $8,000."

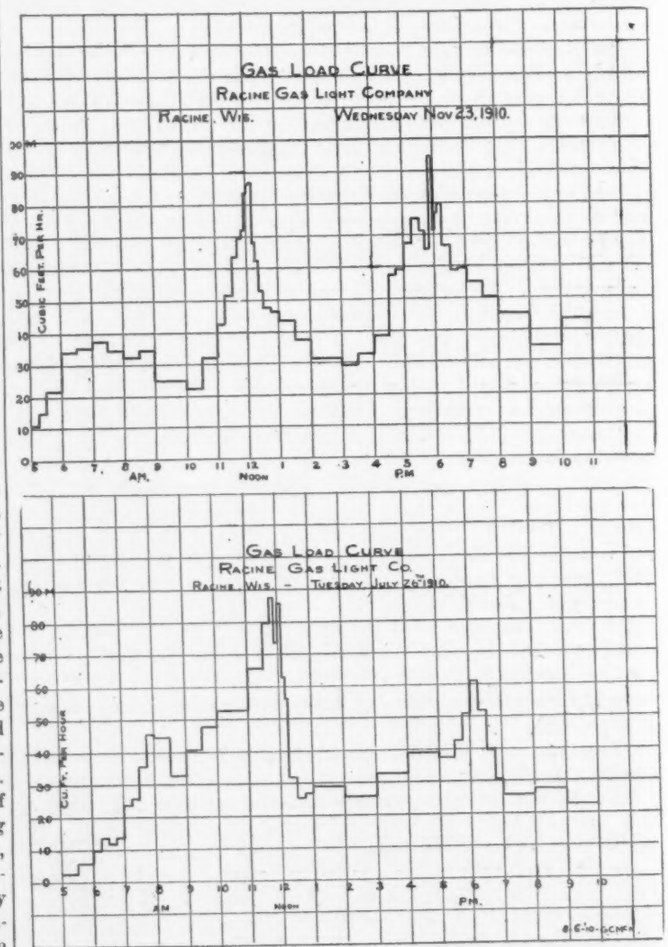
The discussion of the purifiers is concluded with the statement that "Purifiers have a long life, and should Racine finally manufacture all the gas used in Kenosha the capacity of the purifiers will be reached in about 20 years."

Attention is called in the same report to the unusually large holder capacity provided in Racine, this being nearly twice the maximum daily output, whereas good practice provides holder capacity about equal to one day's output, and many cities have plants operating successfully with considerably less than that.

The buildings are quite ornamental in character and show a liberal plan in them. The bricks are laid up in Flemish bond; the pilaster work with stone finish, particularly on the retort house, with the high-grade Ludovici tile roofing; and the brick gateway and connecting wall, with other features, were largely for the purpose of ornamentation.

The report also shows that the question of the reasonableness of the investment in mains or distribution system involved extensive investigation and much careful study. It is pointed out that, in view of the fact that the sizes or capacities of mains requisite to adequate service are dependent upon the number of consumers served through a given line and the average maximum demand rate of those consumers, it was essential to determine the distribution of consumers, and also their rates of gas consumption, as well as to keep in mind the possible or probable growth of business in territory to be served.

Many individual maximum demand rates were obtained by inspectors equipped with stop watches, who observed the test dials of individual meters during the time of preparation of the noon and evening meals. The variation in the composite demand was also investigated from the station end, and several gas station load diagrams were prepared, not only for Racine, but for several other comparable plants in the State. Two of these diagrams, showing the varying demands on the Racine plant, taken Tuesday, July 26, 1910, and Wednesday, November 23, 1910, are shown herewith.



From such data it is apparent that the average maximum demand per consumer will probably not greatly exceed 15 cubic feet per hour, but on the assumption of even 20 cubic feet per consumer per hour, it is certain that a 2-inch main will supply all the gas needed in any block in the residence districts of Racine. This statement, is, of course, not applicable to feeder mains or mains serving many consumers beyond that block, it being made with particular reference to mains in cross streets between parallel feeder mains.

The recent general practice of the Racine Company has been to lay no mains of less diameter than 4-inch. The following table, reproduced from the staff's report, shows an interesting comparison of the percentages of pipe of the different sizes in the Racine and various other gas systems in Wisconstn.

It will be noted that the majority of the Companies lay mains under 4-inch diameter. Madison has 58 per cent. of 2-inch mains; Eau Claire, 24 per cent.; Beloit, 42 per cent.; Appleton, 26 per cent.; while Racine has none at all as small as 2-inch and only 19.7 per cent. of mains smaller than 4-inch. Even with their large proportions of small pipe it is doubtless safe to say that all the other cities in the following table have adequate and satisfactory gas service, including good pressure regulation throughout the systems, since one of the functions of the Commission is to see to it that adequate service is rendered by all utilities in the State, and a staff of gas and electric service inspectors is maintained and routine tests are constantly and regularly being made on the service of these utilities.

In order to give a clear idea of the effect of the use of mains of different sizes upon the investment per mile of main, the Racine prices have been applied to the percentages of the several sizes for each system in the following table, resulting in what may be termed the cost of a composite mile of main. Only one city shows a cost per mile

appreciably greater than in Racine. These figures appear in the last column of the following table:

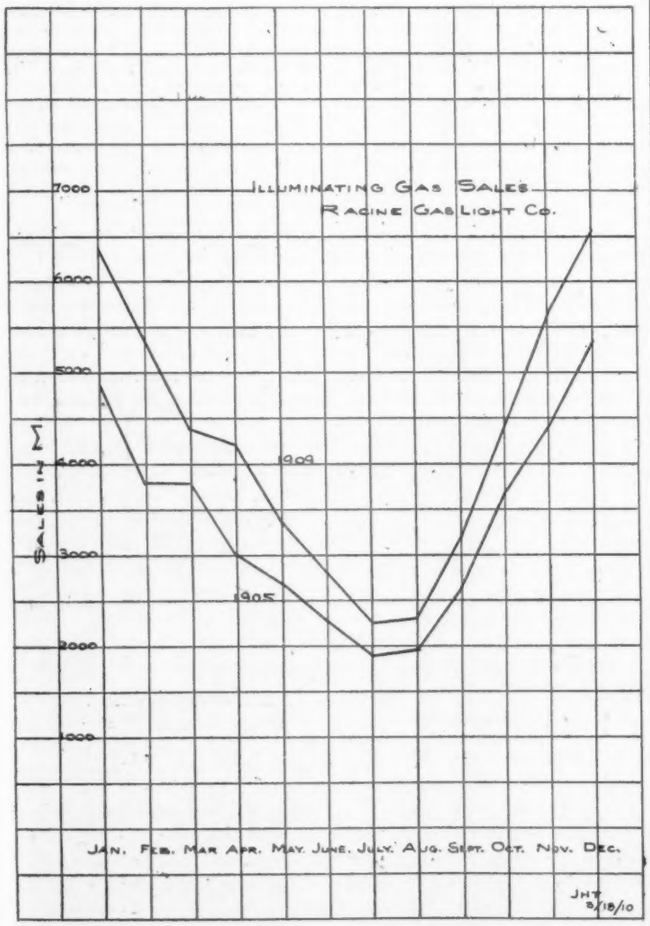
TABLE VII GAS PLANTS - 1909

PERCENTAGE OF LOW PRESSURE MAINS IN VARIOUS WISCONSIN CITIES IN 1909.

	1"	1½"	1¼"	2"	2½"	3"	4"	6"	8"	10"	12"	16"	20"	24"	Miles of Low Pressure Mains	
Appleton	[1] 0.9	1.0	0.8	25.9		1.5	53.6	14.0	2.2						2624.	
Ashland	2.2	1.8	5.7	67.1		13.1	5.0	3.4	0.4	1.0					1552	
Baraboo																
Beaver Dam				2.5	17.9	31.3	39.4	8.3	0.8						2520	
Beloit	1.5	0.7	2.1	42.8		9.1	30.1	12.1	1.5						2157	
Berlin		1.0	0.9	65.4		18.1	14.1		0.4	From Waupaca on 1908.					1634	
Chippewa Falls	0.4	11.0	8.9	47.0	1.4	18.0	5.1	7.2							1620	
Eau Claire		7.5	2.6	24.6		33.9	26.3	1.7	1.7	0.6	0.5				2172	
Fond du Lac				10.8		21.3	49.3	11.6		6.9					2920	
Green Bay				16.6		37.4	24.9	12.9	5.0	0.8	1.1	0.1			2622.	
Janesville					[7] 25.0	11.3	49.3	10.7	1.8	0.1	1.7				2576	Max. 4313
Kenosha				6.1			72.7	16.9		4.3					3071	Min. 1552
La Crosse	0.8	1.0	1.0	28.0	1.5	36.6	19.4	[8] 9.1	0.6	0.6	0.7	From Wausau on 1908.			2276	Avg. 2503
Madison				58.3		2.4	21.6	12.7	0.4	2.5	0.1	1.0			2254	Median 2502
Manitowoc			2.8	2.9	23.1	0.2	[4] 7.2	52.3	7.3	2.4	1.8				2509	
Marinette					17.7		35.7	23.1	20.7	2.9					2651	
Menekonee	0.6	0.2	38.9		13.9	15.8	7.2	17.3							1561	
Milwaukee		0.01	0.03		0.1		5.7	65.8	15.1	0.1	7.8	3.3	1.5	0.3	0.3	3649
Oshkosh					1.9		16.7	57.9	15.4	5.3	2.6					3094
Portage			[6] 10.9		28.0		42.0	13.3	5.8							2040
Racine						1.1	18.6	53.1	22.1		2.4	1.9	0.8		0.1	3228
Rhinelander				28.9	23.7	20.9	18.5	[9] 6.0	1.8							2033
Ripon	[1] 2.6	4.5	17.5	35.8		5.1	10.4	2.1								2060
Sheboygan			4.2	17.1	1.1	5.6	33.4	15.0	0.3	3.0	0.2	0.2				2738
Stevens Point		8.5	6.9	15.3	2.6	13.2	49.8	3.8								2249
Stoughton		[7] 7.2	1.2		[5] 56.6	14.9	14.7	[8] 3.5	1.5	0.4						1812
Superior			0.2	13.5		1.1	33.4	27.6	8.2	6.0						3134
Watertown	1.4	3.5	6.7	44.7	2.6	16.9	10.9	12.3	2.8	0.3						1972
Waukesha [3]			[4] 3.5	3.2		1.1	59.5	18.6	5.7	0.7	0.5					3012
Wausau			[4] 8.2	41.2			8.4	34.9	7.0							2020
Waukatoba				0.6				54.3	11.9		23.1	9.8	0.2			4313
West Allis				10.7				54.9	18.6	9.0	8.4					3318

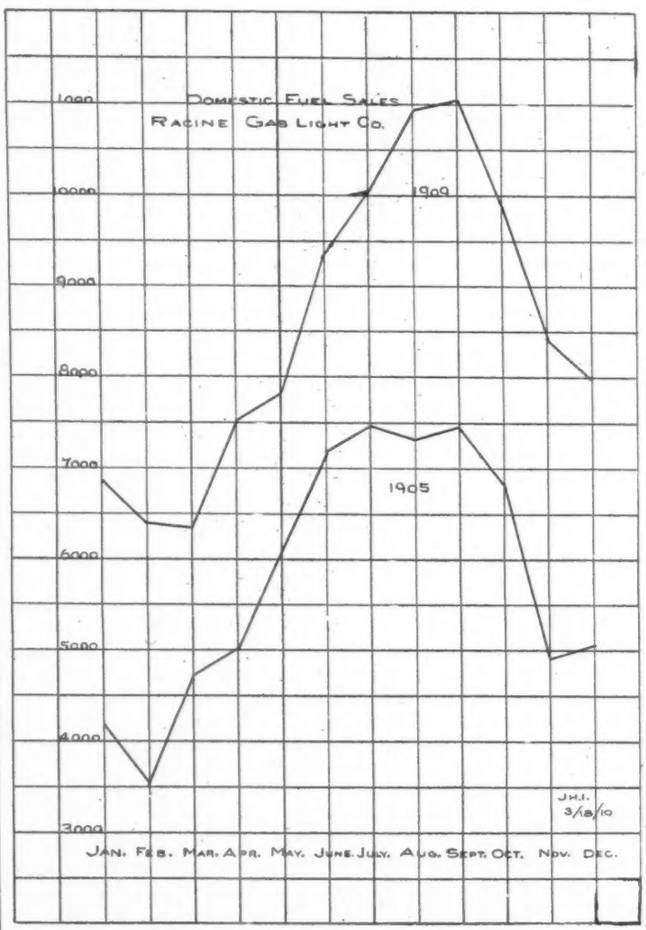
[1] Includes ½". [2] Includes 1". [3] Includes 2". [4] Includes 3". [5] Includes 5". [6] Under 2". [7] 2½" supplied. [8] Includes 6". [9] Includes 8".

Other features of interest in the report are the discussions of the studies of past and probable future growth of respondents' business, and the relation of the fuel and illuminating gas sales during the past 8 years. The following diagrams were presented to show the



1905 and 1909 sales for fuel and illuminating gas separately, and they illustrate to a certain extent the growth of business and the opposing seasonal changes in the magnitudes of the two kinds of business.

Several additional tabulations of statistics, prepared for the purpose of comparing the Racine and various other plants of this kind in Wisconsin, are presented in the report. Among these are "Costs of Maintenance of Mains and Services in Various Wisconsin Cities," "Distribution Investment Statistics" (showing consumers per mile of main, investment in mains per mile and per consumer, gas sales per mile of main and per consumer, etc.), "Investment Data for



Racine, 1901–1909" (showing totals, amounts per consumer and per thousand sales for manufacture, storage and distribution separately for each year), etc.

The conclusions as stated in the report are: "On the whole the investigations conducted and the data compiled show that the Racine investment is greater than is necessary to supply present demands, and is greater than that of any other plant operating in Wisconsin under similar conditions. It is, however, necessary to examine the probable growth of the business before passing finally upon the justification of the present investment. * * * In conclusion, it may be said that the greater investment in Racine than is required for the service rendered, and greater than the average of other plants in the State, is due, not to an excessive investment in any one portion of the plant, but to a very liberal investment throughout. For the most part it does not appear that this large investment has resulted in more economical operation."

Going Value.—The contention of the respondent, in reference to the valuation, which is treated at greatest length in the decision, is that the Company has sustained a large expense in developing the business in its present condition. The Company submitted an exhibit showing its annual expenditures for the promotion of business, and for losses sustained in furnishing to consumers fixtures, piping and appliances at less than their cost to the Company. The promotion of business cost is, in the aggregate, $24,192.75, and adding to this the losses on fixtures, piping and appliances, the total appeared as $168,943.25, June 30, 1908.

Respondent contended that the above sum had been expended by it in securing customers and establishing its business, and no return upon the same had yet been received by the Company, therefore, the whole of that sum should be added to the plant value in determining the value of the property for rate-making purposes. This exhibit shows the expenditures year by year, separated between illuminating construction, fuel gas construction and "business," the Company claiming to have furnished illuminating fixtures, gas ranges, etc., to consumers at less than their cost to the Company. Respondent argued that consumers in Racine will receive the benefit of such expenditures on its part, because when gas can be produced in large volume the expense of production is decreased. It was also argued that the in-

vestors made those expenditures in good faith for the purpose of building up the business and they have not yet had any chance to recoup themselves for such losses.

The same question arose in several earlier cases decided by the Commission, and the reasoning and decisions in those cases are cited in this, to the effect that "The cost of building up the business of a plant is in most cases as unavoidable as the cost of construction of the plant itself; that when such costs are incurred they must be reimbursed in some form by the consumers in order that capital may be secured; that such reimbursement is equitable as between investors and consumers, and that this is a just method of dealing with such costs for other reasons. If this is sound, it also follows that the cost of the business must also be taken into consideration in determining the value of the plants for rate-fixing purposes. This would seem to apply with special force where by law the rates are limited, so as not to yield more than reasonable returns upon the investment. While such legislation may not be a guarantee against losses of any kind, it is clear that, if the rates fixed under these laws should not include anything for the cost of building up the business, there would be no way in which these costs could not be made good to the investors. In that event these costs would become a permanent loss to them; and the consumers in turn would be relieved from paying a reasonable return on a part of the investment or on the capital devoted to furnishing them with the service in question. This is the situation of which investors are taking due notice, and which is entitled to due consideration. If not taken into account it will tend to keep new capital from entering this field, as well as to prevent exact justice to capital which has already entered the same. The former would result in hardships or inconvenience to the consumers; the latter would apparently be unjust to at least many of the present investors in such utilities."

While the Commission recognizes the legitimacy of such costs, it also regards as necessary that such costs shall be reasonable, and that these shall not include items of expense that have been incurred under other than usual conditions, or items that could have been avoided by the exercise of ordinary care and business judgment.

The decision in this case contains a tabulation of the earnings and classified expenses of the respondent for the years 1902–1909, inclusive. From this it is seen that the Company has maintained an account for promotion of business under the head of general expenses. The promotion of business expenses are found to agree with the amounts, which comprised the item of $24,192.75 in the total of $178,943.25, which respondent claimed had not been returned to the investors and should be added to the plant value to arrive at the investment for rate making purposes. In other words, respondent wished to add to the value of the plant costs which had already been included in the operating expenses of the plant, and had already been deducted from the gross earnings year by year. Here arose the question as to whether or not the net earnings of the plant had been great enough, after paying the above described promotion of business and all other legitimate operating expenses, to bring a reasonable return to the investors.

The Commission finds that, after deducting from the gross earnings the sum of all expenses of the plant (except interest on its value), including the promotion of business expenses, taxes and the Commission's estimates of depreciation, as well as all operating expenses, there are left amounts ranging from $52,633 (in 1904) to $72,254 in 1909. The decision then presents a tabular statement prepared by the Commission from the Engineer's valuation, June 30, 1908, and the annual construction accounts of the Company, showing the plant value at the end of each year, and the average value during each year, from which it is found that the Company's profits, expressed as percentages of these annual average plant values, range from 7.4, in 1909, to 11., in 1903, with an average of about 8.5 during the 8 years. The construction accounts of the Company used in the above computations were as kept by the Company and include the losses incurred on fixtures, piping and appliances.

The net earnings available for interest and dividends have also been computed upon another basis, with somewhat different results. In this method, the losses on fixtures, piping and appliances charged to construction have been deducted therefrom and added to the operating accounts, along with the promotion of business expenses. This, it will readily be seen, increases the average annual plant values derived by working backward from the staff's valuation, and increases the operating expenses, leaving lesser amount available for interest on the values of the plant. These latter amounts, however, range from 6.8 per cent. of the average value during 1906 to 8.9 per cent. for 1903.

In reference to its use of the valuation figures prepared by its engineering staff, the Commission says: "The original cost of a plant is also an element that should be taken into consideration in determining its value for rate-making purposes. In fact, this cost is often one of the most important factors that enter into such determinations. In this case, however, we have not been able to obtain what we could regard as entirely reliable data as to this cost. During its existence the plant has changed ownership. A considerable proportion of it was constructed by other than the present owners. The earlier records were, therefore, not available. It is, of course, a fact that the plant is carried at a certain figure on the books of the owner. The cost there given, however, does not seem to meet the situation. For, like most cost figures of the kind, it appears to include items that could hardly be regarded as relevant in these proceedings. Owing to the fact, however, that, in computing the cost of reproduction of the plant as given herein, the figures used as the cost of labor and material were the average prices for a series of years rather than the prices which prevailed at the time of the appraisal, it is not unlikely that the original cost of the plant is quite closely represented by the above cost of reproduction new. At any rate, we have frequently found that, in cases where full data as to the original cost of plants were available, and where the cost of reproduction had been compiled on the same basis as in this case, the original cost and cost of reproduction new were not far apart."

In reference to the staff's report on the liberality of investment in this case, and to the rate of interest which should be used in determining the proper rates for gas in Racine, the following extract from the decision is significant:

"From the facts thus brought out it is quite clear that the investment in the physical property of the plant is both actually and relatively somewhat greater than amount ordinarily required for such demands upon the plants as are made by its customers in this case. In fact, the situation in this respect is such that it is far from clear whether it would be equitable to all concerned to fix rates in this case, the receipts from which will cover operating expenses and in addition to this a return for interest, profit and depreciation on the entire cost of reproduction of the plant at as high rates as those which might ordinarily be regarded as adequate in cities of this size. This statement is made advisedly, for it is obvious that operators are entitled to reasonable latitudes in such matters and that it is sometimes exceedingly difficult to accurately determine future demands."

Apportionment of Expenses.—The decision presents an extended discussion of the growth of the gas business in Racine since 1902, both as regards increase in total sales and numbers of consumers, taking the sales consumers of fuel gas and illuminating gas separately. It is then shown that, before proceeding to apportion the expenses of respondent, in order to arrive at a statement of unit costs upon which the rates might be constructed for consumers in Racine, it was necessary to investigate the cost of supplying the gas produced and transmitted to Kenosha.

This question was determined, first, on what was termed the "additional business" basis. In this the Kenosha business was not charged with any part of the commercial, general or undistributed expenses, or any interest or depreciation except upon apparatus used entirely and exclusively in the Kenosha service. No interest or depreciation on the buildings of the plant, and no interest on the value of any part of the land or other general property, are included in these costs. Assuming 6, 6½ and 7 alternately as the interest rates on the property actually devoted to the Kenosha service, and apportioning operating expenses as explained in the decision, the following costs for gas for Kenosha result:

Using Interest at	Year Ending June 30, 1909.	Year Ending June 30, 1910.
6 per cent	0.61	0.62
6½ per cent	0.63	0.64
7 per cent	0.65	0.66

The cost of gas for Kenosha is then computed in a manner to include a share in the interest on the land, interest and depreciation on the buildings, a share in the general expenses, and all expenses justly chargeable in part to that business, all as explained fully in the decision, with the result that the full cost of the Kenosha gas exceeds 90 cents per 1,000 cubic feet.

The Racine Company contended that the addition of the large Kenosha business resulted in a reduction of unit costs sufficient to justify the price of 50 cents per 1,000 cubic feet, at which gas was furnished by respondent to the Kenosha Company. The Commission's detailed analysis of the unit costs of gas made in Racine does not indicate any marked reduction in the unit costs since the addition of the Kenosha business and the operation of the high pressure line.

In a tabulation showing the apportionment of the expenses of the Racine plant for the years ending June 30, 1909, and June 30, 1910,

the totals of the classified expenses are separated into "output capacity" and "consumer" expenses. The tabulation contains the amounts allowed by the Commission to cover interest and depreciation, these amounts being $74,298.32 in 1909, and $77,383.52 in 1910.

The total of all expenses for the year 1909 ($166,721.12), inclusive of interest and depreciation, divided by the total sales for that year (187,130,000), shows the average cost was $0.891; similarly, the average cost in 1910 was $0.881 per 1,000 cubic feet.

The cost curve, however, upon which the rate schedule is constructed, is not derived from the above averages, but from the output, capacity and consumer expenses separately. The decision indicates quite clearly how it is that the unit costs of service for any consumer decrease as his consumption of gas increases. After a full discussion of the derivation of the equitable rates in this instance, the Commission orders the respondent to discontinue its former schedule and to place in effect as a substitute therefor the following schedule, deemed by the Commission as just and reasonable: For all gas furnished for lighting, fuel, industrial or power purposes, and passing through meter or meters owned and installed by the Company, a charge of $1 net, or $1.10 gross, per 1,000 cubic feet for the first 4,000 cubic feet used during any one month through any one meter; 80 cents net, or 90 cents gross, per 1,000 cubic feet for the next 11,000 cubic feet used during the same month through the same meter; 60 cents net, or 70 cents gross, per 1,000 cubic feet for all gas in excess of 15,000 cubic feet used during the same month and passing through the same meter.

The minimum bill shall be graduated according to the size of meter and shall be as follows:

Size of Meter.	Amount to be Charged Each Month.
3-light	$0.25
5- "	0.25
10- "	0.35
20- "	0.35
30- "	0.50
45- "	0.60
60- "	1.00
80- "	1.50
100- "	2.00
200- "	4.00

The practice and latitudes of the Company in reference to the making and discounting of bills, maintaining burners and appliances, charging for reconnection of meters, etc., are also prescribed in the decision.

In reference to the second point in the prayer of the petitioner, that an order be issued requiring respondent to furnish meters which will accurately register the amount of gas consumed, it is pointed out that rules and regulations governing gas and electric service in Wisconsin were prescribed by the Commission shortly after the filing of the petition and complaint in this case, and that as the observance of these rules and regulations has been followed up by the Commission, no further order in the matter becomes necessary.

[Abstract Report.—Continued from Page 504.]

SIXTH ANNUAL MEETING, NATIONAL COMMERCIAL GAS ASSOCIATION.

Held at Mechanics' Hall, Boston, Mass., Dec. 6th to 9th, 1910

Third Day, Morning Session.

Discussion on the Doherty Paper.

The President said the paper by Mr. Doherty was ready for discussion. As they all know Mr. Doherty was an authority on the subject, and he would be pleased to answer questions that might be asked.

Mr. P. S. Young would ask Mr. Doherty, in view of the large dimension of the bibliography which accompanied the paper, to add a few others which should be read. The author tried to cover the whole, for the speaker had read other papers of his, and supposed he did not wish to interfere with their reading those other papers. He had not brought out in the present paper the effect of competition on rate making. It seemed that competition had been always a very large element in determining rates in the past, and he thought it would always have something to do with future charges made by companies. He was glad that Mr. Doherty brought out the importance of the scientific analysis of the costs of making and distributing gas, using the word "distributing" to cover the sale and delivery of the product, but regretted that Mr. Doherty did not give illustrations from the gas business as well as from the telephone and electric business. The cost mentioned as necessary to consider in connection with the consumer or customer cost, he considered negligible in the case of large ones. They should not forget that, In fact, distributing the customer cost would not help to enlighten them on cost to the large consumer. They were too apt to consider the average cost of gas, roughly noted in day-to-day work use as the cost per 1,000 at the burner, was the cost to all their consumers. The public, therefore, had excuse for considering that average cost was the cost to each individual, and through that habit of thought he believed much prejudice against so-called discrimination had arisen. The importance of dividing their business into classes should be recognized. If they never had a classification which equals that of the transportation companies, nevertheless, they had the right idea. As one railroad man put it, the charge was all that the traffic would bear. That phrase was rather unfortunate, in that it was the cause of much of the agitation against the railroads. Still if that phrase were properly understood it really explained a great deal. He wished the paper carried an analysis of a gas company's costs on the plan Mr. Doherty outlined. That would have illustrated better than anything else how easy it was to divide these so-called customer, demand and energy costs, or gas costs. He didn't mean to say that it was easy to absolutely show exactly these costs, but how easy it was to approximate or approach to them. He believed that would have helped all to a better appreciation of both the difficulties and the simplicity of the division that Mr. Doherty gave them.

Mr. Scherck remarked, in view of the experience of the electrical fraternity, he would say that Mr. Doherty's paper would stand frequent close study. At the 1900 meeting of the National Electric Light Association, Mr. Doherty read a paper, and he presumed 9 out of 10 of those who heard it thought that he was far too theoretical in his analysis. That the thing was not practical, yet the test of time proved that the electrical fraternity should long ago have listened very carefully to what Mr. Doherty then said. In connection with the different references given in this paper, he suggested that the members should secure a copy of the minutes of the preliminary meeting on rates, held before the New York Public Service Commission, on September 7th, and read the advice the Chairman gave in the Commission's jurisdiction, especially the remarks on what constituted discrimination. They should further pay attention to what is now going on in New York State in the appointment by the Public Service Commission of a rate committee, a committee composed of representatives from the different electric light companies as well as the Commission's own representatives. History was being made there, and it was worth while to note what was being done. As to the effect of competition, he thought all admitted, going right to their theory of rate-making, they were better able to take care of competition than if they went wrong merely to meet competition for the time being. Mr. Doherty has had the satisfaction of knowing that most of them who had done any work on rate-making since had in some degree borrowed a great many of his ideas. There was no question, as far as the American public was concerned, and as far as the different central stations are concerned, while he modestly gave precedence to Dr. Hopkinson, it was brought to the attention of the central stations of this country through Mr. Doherty. One point that bothered them much in connection with rate-making for the gas industry was a practical method which would stand before all commissions, of determining the demand for different consumers of gas. They had a method in the electrical business through different instruments which were in practical use, but he had always been stumped on that matter as far as gas was concerned. He brought that question up at the American Gas Institute meeting, and Mr. Searle, of Rochester, N.Y., informed him that such an instrument was about to be put on the market that would not only be reasonable in price, but would also be commercially successful.

Mr. Carl H. Graf said he wished first to emphasize emphatically Mr. Doherty's statement that the rate-making was not on a scientific basis, although he also believed the bulk of their operation in the gas business was fairly so. Mr. Doherty's fundamental principles undoubtedly were all right, but if they adopted them he foresaw some difficulties. He knew but little about the adoption of rates in the electrical business, and, as far as he knew, in every case where they were adopted the authorized rate on a franchise was the maximum rate, the divisions below being simply done by the companies to increase their business in a profitable way. It seemed to him a difficulty in their case was there was hardly a gas company whose maximum rate at the present time caused every consumer to be a profitable one. They should have a basis to start on, so that every consumer would at least not be a losing consumer. Another thing that troubled him on a

proposition of this kind, which he believed was absolutely right, was what they were going to do with their prepayment meters. Prepayment meters were put in to save charges for collection, and he failed to see any device that could be put on a meter of this sort which would take care of the different charges that Mr. Doherty mentioned.

Mr. H. D. Frueauff said that, prior to the advent of the "readiness-to-serve" method of selling gas and current, it was customary to use a minimum charge as a means of protecting the company against loss, upon the erroneous assumption that such method would bring about equity of charging. He thought it of value in discussing this paper to call attention to the fact that a minimum charge could never be thoroughly equitable. Take as example a minimum charge of 50 cents per consumer for gas consumption; that is, that the monthly bill will be rendered at the rate of 50 cents for any quantity of gas under 500 feet when the rate is $1 per 1,000. It was apparent the company could supply two consumers at the same cost that were otherwise identical, although one used no gas and the other used 400 feet. The company furnished not only all of the service to the one who used 400 feet of gas that it furnished the other who used no gas, for which reason exact equity could only be had between different consumers, through making a fixed charge plus a charge for gas or current.

Mr. Hughes said that in a decision handed down by the Railroad Commission of Wisconsin, in the case of the Madison Gas and Electric Company, carried a lengthy discussion by the Commission on the question of rates. The language was very simple, and the subject was well handled. In addition one or more analyses had been made on the basis of the system advocated by Mr. Doherty in which consumer and demand expenses are treated. This publication could probably be had by anyone on request to the Railroad Commission, Madison, Wis.

Mr. Kennedy said the long continued use of their present method of selling gas made the suggestion of a change seem almost impossible and without justification, and the advisability of a change could only be appreciated by those who were willing to make careful estimates or analysis of the cost of supplying difierent classes of consumers. There was much difference in cost in supplying different classes of consumers and exaggerated examples were not necessary to make such difference apparent. Assuming two groups of consumers using about the same quantity of gas per year, the first group consisting of a number who used the gas for house heating purposes, the second group using a like amount of gas for industrial fuel or power purposes, the difference in cost would immediately become apparent. Those using gas on former account would use no gas throughout the summer months, their use being confined to the winter season. Thus, instead of using gas uniformly through the 6 months' period, it was used at an excessive rate during the cold days in winter, requiring an enormous amount of reserve generating apparatus, which would only be used a few days in each year, but required a like capacity for maximum demand in the distributing system; while the group who used gas for industrial purposes would, on an average, use gas at about a uniform rate throughout the entire year, and would require much less investment both for works' generating equipment and distributing system. Another interesting example was to compare the ordinary private consumer of illuminating gas as against gas sold for street lighting purpsses. Many private lighting consumers demanded all of the gas they used during 5 hours of the shortest winter days, perhaps not to exceed 1 hour in the long summer days, the average rate of demand being not more than 3 hours per day. In other words, all of the gas used by these consumers must be furnished over a 3-hour period, while the public street lamps averaged nearly 12 hours a day, or gas was sold at a uniform rate for nearly 4 times as long as for the private consumer, requiring only one-third the conductivity in the distributing system.

Mr. C. N. Stannard thought the use of differential methods of charging by various electric companies had made it difficult to hold a certain class of business for the gas companies. Most of these differential methods of charging took the form of much lower prices for the large and long-hour consumers; and when the electrical solicitor could quote a rate much lower than the ordinary rate for this class of consumer, though the gas solicitor must stick to a uniform rate for every consumer, it gave the former a great advantage in the acquisition of most desirable business.

The President asked Mr. Doherty to close the discussion.

Mr. Doherty asked the Chairman to give a few minutes to Mr. R. S. Hale, who was an electric light rate expert, and was probably more familiar with the literature on rates than anybody else.

Mr. R. S. Hale said he did not feel that he could add anything over the matter of gas rates, but he would like very much to emphasize the point, that all this discussion about rates was not bringing forward any new principles about rates in gas, electric light or telephone business. The underlying fundamental principles were the same in all businesses; just a matter of detail. In the electric business they had worked a long time on the details, and they were not entirely satisfactory as yet, but they thought that what they had done had accomplished much, They felt sure when in these different systems they had to compete against either steam, gas, or any other kind of competition with the electric business, with an unscientific rate system, their scientific rate systems helped them very much. However, the underlying principles were all the same, and so it is merely a case of their neglectful application.

Mr. Doherty, in closing the discussion, said he would be as brief as possible. The first speaker regretted the writer had not furnished actual figures and definite examples with regard to the gas business. He had, however, learned from experience not to do that. In his paper before the National Electric Light Association, at Chicago, he furnished definite figures and definite examples, and instead of discussing the underlying principles, or having their attention directed to the underlying principles, it was directed largely to the specific figures given; therefore, he thought it better to write a paper for this Association which did not involve any mathematical treatment of the subject, was purely explanatory and as simple and fundamental as possible. One could not cover all of the rate problem in a single paper. He once spent 2½ hours answering one opponent, and if he had covered the whole rate problem he was inclined to think it would have taken about 3 days to do it. The bibliography given is only brought down to 1906. He had put a young man on the work of bringing the bibliography to the present date, and having worked on it 3 days he found 147 different items relating to the rate problem, yet he was not anywhere near through, and concluded it was useless to bring the bibliography down to date in any reasonable length of time. In other words, the amount of discussion given the rate problem is growing every day, and in the last 2 years an enormous amount was written on the subject. He had to touch on other points without any proper sequence, so he would take the notes as he found them. First he called particular attention to the relation between industrial fuel gas and gas used for house heating purposes. Just prior to the reading of his yaper the pictures showing the wonderful development that has already taken place in industrial fuel gas were shown. That was simply a starter, for many of their large cities had not even gone to work seriously on the application of gas to industrial uses. When they sold gas at $1 per 1,000 they were selling gas at $1.50 a million B.T.U.'s, while hard coal at $5 a ton meant about 20 cents a million B.T.U.'s; in other words, they were trying to sell gas at 7½ times the cost of hard coal at $5 a ton, when both were reduced to a B.T.U. basis. The reason they had to get $1.50 a million B.T.U.'s was the nature of their service. For instance, if they were selling gas simply for household use in cooking, lighting and heating, they would have the condition where, on the coldest day in the winter in any of the Northern States, the amount of equipment they would be using would be 18 times as much as on a normal day in July; in other words, they would require manufacturing plant big enough to take care of a demand 18 times as big as the normal demand in July. They would have a load factor of approximately 16 per cent. on their manufacturing plant, and the load factor on the distributing system would be very much lower. In other words, the investment would be something enormous for the sale of a given quantity of gas. If they were selling that same quantity of gas for industrial uses, where it was used say 10 hours a day, every day in the year, it would take a very small investment to take care of that class of customer. If their rates were rational, and were simply aimed to make the same profit on all consumers, the rate system would automatically bring their profitable consumers, such as the industrial users, to a rate that would command their business. They were trying to command business at rates abnormally high in relation to the cost of all service. Where the franchise fixed the maximum rate which the company could charge, the scientific rate methods were only applied as a means of giving discounts, or as a means of reaching the industrial fuel gas user, giving him a lower rate without giving a lower rate to all consumers not entitled to it. Someone spoke about the wisdom of putting their rates on a scientific basis. He told them before that many of the electrical men in the early days ridiculed the idea of any elaborate system of rates. Anything that was based on more than one element of the cost of service they regarded as elaborate and impractical. Prior to 1896 a great deal of current was sold on flat rates; that is, the electric

company charged so much per lamp per month, or it charged so much per consumer per month. It would give somebody a rate of say $5 a month. Due largely to the work of the manufacturers, the electric men were taught to believe that the giving of flat rates was an evidence of poor management, and almost universally the electric companies changed over to a meter basis, such as they used in the gas business. In 1906 or 1907 the tungsten lamp was brought out, which lamp has a nominal efficiency of about 1¼ watts per candle, as against the old lamp, from 3.1 to 4 watts per candle. The tungsten lamp upset the conditions in the electrical business very much, and then a great number of electric light men said, "Why, the amount of current they use is not so important; the demand is the important thing; so the thing for us to do is to change back to a demand basis." It had gone so far that a company had been organized in London, England, which was designated the "Fixed Charge Electric Supply Company," or something of that sort, which bought current from the ordinary supply company and then re-sold the current. Many electric men are in the absurd position of having adopted a certain system of charging and later abandoning it, going to the meter system, abusing the old, flat rate system, and are now coming back to the latter. That condition would never have existed had they changed directly from the flat rate system to some rational system of charging, for if they had really hit a rational system of charging it would fit any condition that came up. There was no very satisfactory method of fixing the demand of a gas or an electric consumer. Their appliances for fixing the demand of electrical consumers were more numerous and more easily applied. In most cases they don't attempt to fix the demand, but estimate it. Devices were on the market that absolutely limited the demand, and the trouble that was expected with that feature of this method of charging had been more a matter of imagination than of reality. They could get volumetric gas regulators, and in a way limit the demand of every consumer by the size of the meter that was set; but there was no scientific method of limiting that demand within narrow limits, although simply a disk, with a hole in it, inserted in some place in the supply pipe, would, in a measure, give them a crude control of the demand.

The President thought he could safely assume to extend the thanks of the Association to Mr. Doherty for his excellent presentation of so important a subject.

A motion to adjourn to 10 o'clock the following morning was here declared adopted.

FOURTH DAY—MORNING SESSION.

President Wrightington called the convention to order at 10:30 A.M., and introduced Mr. R. C. Frampton, of Pittsburgh, Pa., who read the following paper on

WATER HEATERS.

Recent reports would indicate that there are to-day in excess of ½ million gas water heaters in use in the United States. It is, therefore, reasonable to suppose that the general use of the gas water heater is in the home. This makes the water heater all the more interesting, in that 50 per cent. of the total gas consumption comes from the domestic gas range, and the water heater is closely allied to the gas range in the home, and is destined to some day occupy nearly the same important position, from the gas man's standpoint.

Not many years ago the average price received by the gas company for gas ranges was $15, including all connections. The tendency was to buy a cheap gas range and sell it without profit. During the last few years it has been demonstrated that it is only possible to sell gas ranges at a profit, but it is possible to sell a very much higher grade of gas range; and it is not uncommon to find 25 per cent. of all the stoves sold in the larger cities to be of the more expensive high-oven or cabinet type. The public wants *service*, and the above condition is brought out to emphasize the big fact that *price* should be a secondary consideration.

It is not our intention to make specific recommendations as to various localities, as we realize that each locality has its own problems to solve. We want to bring out the facts as they exist, pointing out the opportunities and letting you draw your own conclusions.

Estimates furnished by very many of the prominent commercial gas men in this country indicate that the average consumption derived from the use of the circulating type, or tank water heater, is approximately 6,000 cubic feet per year; of the instantaneous bathroom type of gas water heater, 9,000 to 10,000 cubic feet of per year; and of the instantaneous automatic gas water heater, 27,000 to 120,000 cubic feet of gas per year.

Figures taken from the records of 61 automatic instantaneous water heaters in Detroit show an average consumption of 79,000 cubic feet per heater per year. The smaller sizes average 64,000 cubic feet, while the larger size run more than 84,000 cubic feet.

In Milwaukee 85 automatic instantaneous gas water heaters, supplied through separate meters, showed in the year 1909 an average consumption of 4,300 cubic feet per month. Of these, 3 averaged 1,000 cubic feet or less per month; 14 averaged 1,100 to 2,000 feet; 17 averaged 2,100 to 3,000 cubic feet; 19 averaged 3,100 to 4,000: 11 averaged 4,100 to 5,000; 16 averaged 6,100 to 10,000; and 5 over 10,000 cubic feet per month.

In Philadelphia it is estimated that the average consumption of the automatic instantaneous gas water heaters is 38,000 cubic feet per year.

In Chicago 100 automatic instantaneous gas water heaters yielded bills averaging $4 per month.

From these figures it is evident that we would much prefer to see the automatic instantaneous gas water heater installed than any other type. There are, however, other things to be taken into consideration, among them the size of the main and service necessary and the size of the meter necessary. Personally, we do not think that the size of the main would affect this question, except in some individual cases.

The difference in cost to the gas company between a 1¼-inch and 1½-inch service, and a 5-light and a 20-light "A" meter, would not be to exceed $6 or $7 extra. It would seem that the extra consumption well warrants the added expense. Gas companies are selling service, and the value of the water heater to the consumer is a highly important consideration.

There are four general types of gas water heaters; namely, tank, instantaneous bathroom, automatic instantaneous and automatic storage heaters; and these should be considered from the three standpoints of installation, operation and maintenance.

- The Gas Water-heater.
  - Value to Gas Co.
    - Revenue—Gas ..... Commercial
      - Tank Heater.
      - Instantaneous.
      - Instantaneous-automatic.
      - Automatic Storage.
    - Expense ...
      - Main.
      - Service.
      - Meter.
  - Value to consumer.
    - Tank .....
      - Installation . Location. Space required. Cost.
      - Operation ... Convenience. Speed. Gas cost.
      - Maintenance Frequency of attention. Cost.
    - Instantaneous .....
      - Installation . Location. Space required. Cost.
      - Operation ... Convenience. Speed. Gas cost.
      - Maintenance Frequency of attention. Cost.
    - Instantaneous-automatic ....
      - Installation.. Location. Space required. Cost.
      - Operation ... Convenience. Speed. Gas cost.
      - Maintenance Frequency of attention. Cost.
    - Automatic Storage..
      - Installation.. Location. Space required. Cost.
      - Operation ... Convenience. Speed. Cost.
      - Maintenance Frequency of attention. Cost.

Installation could in turn be considered from the standpoints of location, space required, estimated life and cost; operation, from the standpoints of convenience, speed and gas cost; and maintenance, from the standpoints of frequency of attention and cost.

If we dwell on each of these items for each type of heater it will, we believe, bring out the fact conclusively that we are serving our own best interests and the interests of our consumers if we endeavor to promote the sale of some form of automatic gas water heater.

Not the least of the attractions of apartment house life to women is that they have a plentiful supply of hot water all the time. Do they realize that they pay from $3 to $5 per month extra for their flat, because they are getting all the hot water they want? If they should be shown, wouldn't they be willing to pay the same $3 to $5 per month to have that same service in their individual homes instead of in flats?

The mere fact that the selling price of the gas ranges that are being sold to-day is double what it was 4 or 5 years ago would indicate that it would not be a hard matter to increase the cost of the gas water heater from a nominal $25 of the tank size and type to $50, or a possible $100.

How to Get Customers to Use Water Heaters.—The solution of this is good advertising and salesmanship combined; in other words, giving the water heater branch of the new business department the amount of attention and prominence that it well deserves. The manufacturers are as vitally interested, if not more so, in the sale of water heaters than the gas men, and they offer to the gas men the benefit of their long experience in advertising and selling water heaters, as well as in their installation and maintenance.

Several of the larger manufacturers of water heaters now maintain regular advertising departments, willing to study the local conditions in each field and then co-operate with the gas man in his advertising and help him devise means best calculated to secure sales of water heaters, particularly of the automatic type. Other companies maintain demonstration crews to organize exhibits, some maintain experts who instruct gas company salesmen, give helpful talk, help to close hard prospects, assist mechanical departments with installations, repairs, etc. The heater manufacturing companies are constantly gathering data and knowledge to assist in attaining mechanical perfection and in adapting their heaters to the different local conditions, gases, water pressures, etc.

Campaigns should be carried on to educate the public to use more hot water; not necessarily to be produced by the kind of heater that you propose to sell, but in all ways to induce the general public to appreciate the luxury of plenty of hot water and the desirability of more hot baths. Bring out the fact, for instance, that the nervously inclined person would be perfectly willing to pay 5 cents for a good night's sleep, which he could ordinarily be assured of by taking a 2-minute hot bath just before retiring. There are many such talking points without talking about gas, for inducing the public to want plenty of hot water, day and night.

Points to be Considered by the Commercial Buyer.—Our conclusions here are based on the suggestions made by practically all of the manufacturers of water heaters in the business. We summarize the consensus of opinion as follows:

1. The copper coil as a heating medium is now generally recognized as being more efficient, satisfactory and durable than any other type of heating surface.

2. Removable and accessible burners of high heating power are desirable. They must be of simple construction and easy to clean and repair. Interchangeable mixer nozzles are demanded. In automatic heating, having thermostatic control, burners having copper gauze plates are preferred; whereas, in the burners for circulating tank heaters, the flame check screens are not favored, but the straight drilled burner is preferred.

3. On the tank heaters the solid type of jacket is giving way to the open front, hinge-door type, with the pilot light eliminated, thus necessitating the opening of door in order to light the burner.

4. In the automatic heaters, the form of mechanism combining thermostatic, or temperature regulation, with water pressure control, is the type genenally favored by manufacturers of this class of heaters.

5. A difference of opinion exists as to whether the internal or external type of thermostat is preferred, the internal thermostats being preferred by some on account of their being located nearer the seat of activity, while the external thermostats are often favored because of their circulating features and greater accessibility.

6. The type of jacket for automatic heaters having the double, cast iron wall, with large air space between, and with doors of liberal size exposing the coil and burner compartments, has been adopted by all manufacturers, thus permitting easy cleaning of coils and burners.

7. The automatic, supplementary system of connecting heaters, whereby all water is first taken through the ordinary tank, heated by a coil in the coal furnace, is favored by practically all water heater manufacturers and used by practically all gas companies in making installations, especially in the cooler climates.

Through this improved system of installing, automatic heaters are now mostly used all the year 'round, instead of being merely a hot weather adjunct. This gives the gas company a consumption of gas in the winter, as well as in summer, and also does much toward promoting the advent of the all-gas kitchen, the dream of every progressive gas man.

If 25 per cent. of the good gas consumers of the country were induced to use some sort of automatic gas water heater, over 13 per cent. would be added to the per capita sales of the various gas companies.

Many of the leading gas men admit that the great future expansion in the fuel gas industry must come through the medium of gas water heaters. The new business man is becoming very much alive to their possibilities. It is an often-heard remark, "We must get after the water heater department; we realize we are not selling one-half enough gas water heaters."

In some sections, where the gas company operates its mains under the high pressure system, and uses smaller mains than ordinarily found, also where extreme low water pressures are encountered, there has been a demand for a small, automatic, gas storage system. The manufacturers are responding to this demand, and the small, automatic, gas storage system has now been perfected to the point where it is a very dependable and satisfactory apparatus. The tank is so constructed that spud outlets are left for connections to the coil in the coal heating furnace, the installation usually being in the basement.

The tanks are heavily insulated, and, while the cost of gas per gallon of water heated is necessarily from 25 to 40 per cent. higher than with the automatic instantaneous system, in many sections these small storage systems are giving good satisfaction.

Relative to the efficiency of the various types of water heaters, there are two kinds of efficiency: First, what is termed the initial test, made when heater is new and burners and heating surfaces are clean and conditions entirely favorable; and, second, service efficiency, or the results obtained in practical use under average conditions, with the heater receiving only the normal amount of attention as to cleaning of burners and heating surfaces.

The automatic instantaneous heater of the better makes shows an initial efficiency of from 80 to 85 per cent., which is very high, especially when compared with heating and steam generating apparatus in general. In the automatic instantaneous heaters the service efficiency is also very high, usually showing from 75 to 80 per cent., even after the heater has had several years of service with only the average maintenance attention.

In the circulating tank heaters the better grades of double copper coil heaters show from 65 to 70 per cent. efficiency on initial tests; and, in service efficiency after years of use, with only normal attention, this type of heater usually shows within 4 to 5 per cent. of its initial efficiency test. The cast iron tank water heaters of the better types show practically the same initial efficiency as the copper coil heaters, but their service efficiency is not nearly as good and the maintenance cost is usually much higher than with the copper coil type.

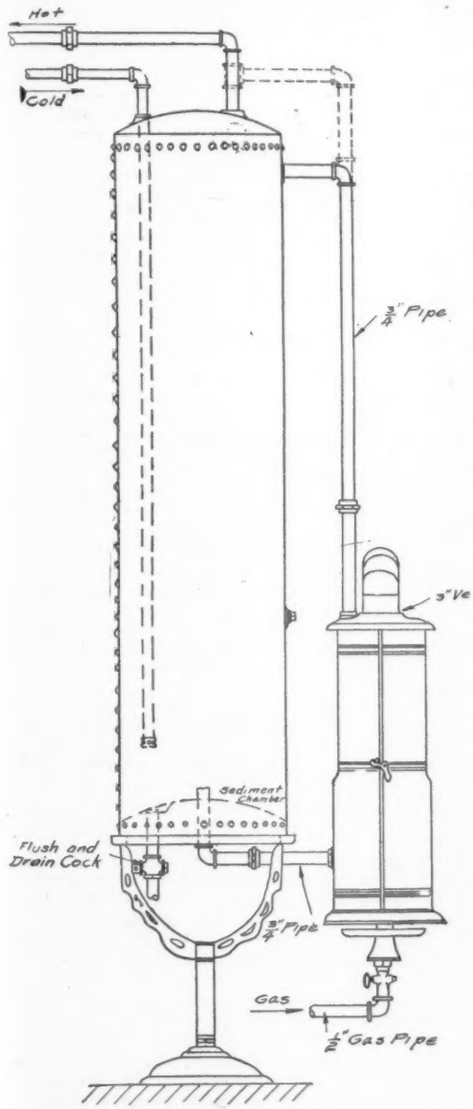
Of the instantaneous heaters, those of the contact type show the highest efficiency, but have the one great fault of bringing the water into more or less direct contact with the hot products of combustion; and, since hot water is a good chemical solvent for many gases, it is contaminated by such contact, especially after the burners become fouled with dirt.

In the automatic storage system, the initial efficiency and service efficiency are less than with the automatic instantaneous heater. It requires about 1¼ cubic feet of 650 B.T.U. gas to raise 1 gallon of water 63° F. on initial test, as against 1 cubic foot for the automatic instantaneous heater. On the service efficiency the automatic storage system does not hold up as well as the automatic instantaneous, due principally to the fact that the continuous hard service on the burners causes them to become corroded or fouled very much sooner, and even with occasional cleaning and with tank heavily insulated, it will usually require about 1½ cubic feet of gas to raise 1 gallon of water 63° F., with 650 B.T.U. gas.

It is now pretty generally conceded that the copper coil type of gas water heater is preferable to all others. The very high heat conductivity of copper, combined with its high mechanical strength,

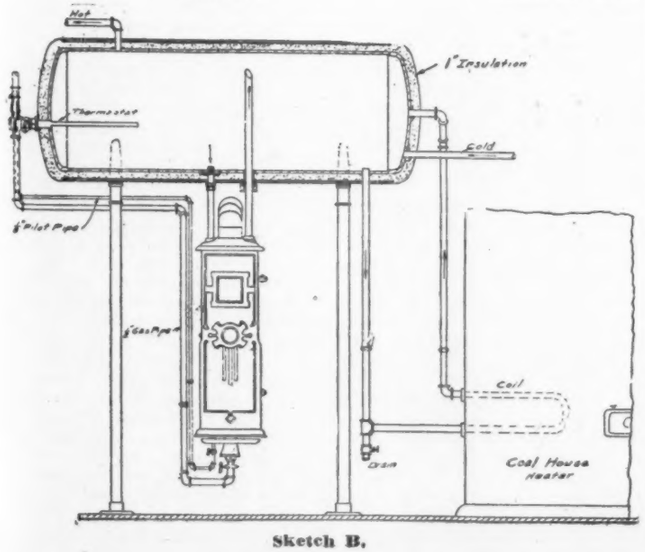
makes it an ideal material for a water-heating receptacle. Being practically free from all tendency to corrosion, the water is never contaminated, the heating surfaces are easily cleaned, and, viewed from all standpoints, heaters of this construction far excel in durability and efficiency.

It remains to be seen whether or not the gas man will seize the great opportunity presented for the expansion of his business through the use of high-grade gas water heaters. Much has already been done, and the magnificent results obtained by some gas companies in developing their water heater business should act as an incentive to others. The gas water heater industry is now merely in its infancy, and to insure that rapid expansion (with its consequent gas consumption), so desirable to all, there must be intelligent and cordial co-operation between gas men and the manufacturers. The heaters themselves have already been perfected to a very high point of efficiency and service and the time for a marvelous development of the business is at hand. The accompanying sketches show some of the more recent gas water heater developments.



Sketch A.

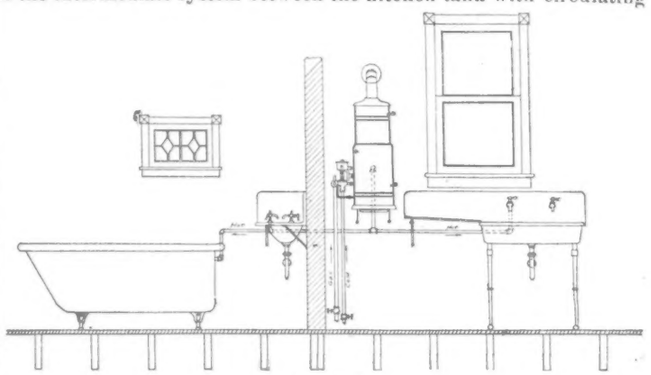
Sketch A.—Improved method of connecting circulating heaters in kitchen tanks, showing the inlet in side of tank near top, thus avoiding the trap and air bind usually in evidence.



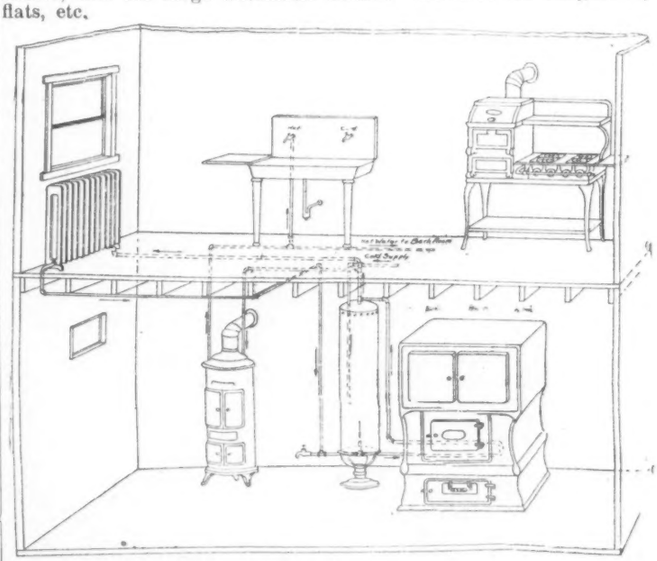
Sketch B.

Sketch B.—One style of small automatic gas storage system with separate set of circulators to coil in house heating furnace.

Sketch C.—The new type of small automatic water heater, which is the intermediate system between the kitchen tank with circulating heater, and the large automatic heater. Suitable for bungalows, flats, etc.



Sketch C.



Sketch D.

Sketch D.—A new form of the automatic supplementary system for installing automatic heaters, showing the tempering tank as located in basement. Also showing one form of securing the all-gas kitchen for old homes. (To be Continued.)

[Continued from page 510.]

THIRD ANNUAL MEETING, INDIANA GAS ASSOCIATION.

Held in Fort Wayne, Ind., January 18th and 19th, 1911.

First Day—Morning Session.

The Secretary—Let me make it known that if any member has not received his badge, it may be obtained at the entrance of the hall. In the case of guests, we shall be very glad to have them accept a badge, the wearer to insert his name in the top of it for identification.

The Secretary also read the report of the Entertainment Committee, outlining the nature of sightseeing and other entertainment provided. He also read a letter from "The Indianapolis Trade Association," extending a most cordial invitation to the Association to hold its next meeting in Indianapolis.

Adjournment to 2 P.M. was ordered.

First Day—Afternoon Session.

The President—We closed the last session with a joint paper by Messrs. Dunbar and Davis, a paper that comes very close to the gas man of the present time. As the matter treated is going to grow in importance, it strikes me, where there is a constant attempt on the part of the public and the authorities to cut down the price of gas, the companies should be allowed to give the consumers the product that will give them the most for the money. The paper points out that only about 10 per cent. of gas is used for illuminating purposes where illuminating value is the object. The balance is used in incandescent burners and for domestic and industrial purposes. It is a question in my mind whether 600 B.T.U. is the proper standard. At

the same time, we all realize there is probably a limit below which we could not afford to distribute gas. I refer in this particular to the carrying capacity of our mains. Illustrating, I do not believe we could afford to put a 200 B.T.U. gas out at any price, if we had to double the capacity of our main system in order to distribute this gas. As to tests on coal gas at Indianapolis. The statement made by Mr. Dunbar was that the highest candle power that could be obtained was 16. The installation there consists of 20-foot through retorts, having a standpipe at one end only. After Mr. Davis' talk this morning, you can readily see what the effect would be on the gas travelling through this retort. I have no doubt, with our conditions there, if we had 9-foot retorts we would find a material increase in the candle power, although the heating value would be the same. This paper is a most valuable one, and while I do not believe that it can be dis cussed to any extent without some preparation, I nevertheless want you all to join in the discussion by asking questions that will stimulate debate. I ask Mr. Thwing to open the discussion.

Discussing the Dunbar-Davis Paper.

Mr. Thwing—I received a copy of this paper only a day or two ago, and on account of being a local member of the Association, I have been very busy since then. I would have been very glad indeed to have prepared a written discussion, although there is very little to discuss, other than to agree with the conclusions which have been drawn by the writers of the composite paper. It is undoubtedly the opinion and the decision of modern gas men and modern State Commissions that the proper method of determining the value of gas is by heat value rather than candle power, on account of the fact, as so ably shown in the Dunbar section of the paper, that this is the value for which the consumers are paying. The use of gas for fuel has widely exceeded its use for light as far as the volume of gas produced by gas companies is concerned. At the same time, its use for light, instead of being reduced, has increased, the reason for such increase being well shown in the exposition attempted by the Indiana Gas Association, and which show is located across the street. However, the use of gas for lighting purposes under present-day methods dedends very largely and in fact almost entirely upon its heating value. The open flame burners dependent for their value upon the candle power of the gas are becoming a thing of the past. Their use is only incidental, like a match, an oil lamp, or candle, not as common domestic articles. The tendency of the latest or modern commissions is to recognize the fact that the heating value of gas is the standard upon which contracts or requirements should be based. I trust gas companies will recognize this fact in the near future, because, speaking from the manufacturers' standpoint, I find the most minute attention, particularly in water gas contracts, is paid to the candles per gallon produced. Some years ago, when actively in the gas business, the manager of our company asked if I could not produce candle power at the expense of heat value and the relative reduction in the amount of oil used. I experimented for some time and finally succeeded. The city requirements at that time were for candle power exclusively, and I believe they are still. After we reached the solution of the problem we ran for 2 weeks with very remarkable and gratifying candle power results. A little before that time I got word to desist. The business department had been flooded with complaints from the users of gas stoves and gas fuel appliances. The candle power did not cut much if any figure. The heat value of the gas having been found lacking by the customers of the company, a flood of complaints came immediately. No one questions that, especially in water gas operations, heat value can be produced at the expense of candle power, and I believe that should be the object of water gas operation both present and the future. The same thing can be done to a less extent in coal gas properties, but modern methods of producing results require that a large yield and consequently high heat shall be produced from the coal. I believe this paper is of great value, and the Davis section, giving chemical reactions, etc., is absolutely correct. They explain to the gas men why conditions change from the same materials, and are well worthy of a place in the library. They are incontrovertible and of value to the Association. But the paper to my mind was written with the idea of pledging this Association to the recommendation that a standard of heat value should be used rather than a standard of candle power, which is a relic from the first years of the gas business, and Mr. Davis' contribution to the paper indicates how the ends can be obtained when the desirable restrictions are obtained.

The President—Is Mr. Battin present? I will ask him to carry on the discussion.

Mr. W. I. Battin—When I first received your letters, asking me to submit a discussion of the paper under consideration, I saw the title of the paper and was inclined to write back that I did not care to discuss the subject; that I didn't think there was any relation existing, and really did not have any interest in the matter. But when I saw the way the paper had been handled, and the subject brought out, I realized there was nothing I could say in the way of criticism. I could only emphasize the points that were brought out. The candle power we get is a sort of an un-get-at-able-ness, but we all know it has not any fixed definite value, whereas heat units are parts of the fundamental laws of the universe. The gas machine is really a heat machine, first of all. You can't get at the efficiency of the machine excepting on a heat unit basis. You have to compare the number of heat units you put in with the number you get out. You can't expect to get as good an efficiency, then, if you are trying to produce a by-product in the form of candle power as if you work on a strictly heat unit basis. We, in Indiana, have nearly all used natural gas, and, therefore, know that natural gas, which has practically no candle power value, is suitable for all the uses to which artificial gas is to be used. For this reason we can hope our State will join with Wisconsin in taking the lead in establishing the heat unit basis, and I believe that in a short time such a basis will be adopted, not only in this country, but abroad as well. We surely should thank Mr. Dunbar and Mr. Davis for bringing this so clearly before us. As far as the practical side is concerned, nothing we can do will enable us to give more returns to the consumers for their money than to go on the heat unit basis.

Mr. Danforth—I have no criticism to make of the paper. I thought a year or so ago that candle power and heat units had a constant value, but I noticed an article by Prof. Lewes -I think it is in the Ohio Gas Light Association "Proceedings" for 1905—and about a year ago the Western Gas Construction Company was making a test on a machine in one of the Indiana Lighting Company's towns, and we had no accurate way of measuring the candle power. Their guaranty called for so many candles per gallon, and I suggested that, as we had a calorimeter, we might make a calorimeter test of the gas, making a test of the candle power by the Lewes table. We took the matter up with Mr. Thwing, who objected very strongly to the proposition, and I can very plainly see now why. At that time I did not understand as clearly as I do now; but we eventually got the candle power test straightened out. I think Mr. Davis' paper shows that candle power and heat units certainly have no constant relation to each other.

The President—Would any other gentleman like to discuss this paper?

Mr. Macbeth—I would like to ask a question on a point of information. On page 2 Mr. Dunbar says: "To-day it is almost safe to assert 90 per cent. of the gas used for light is consumed in Bunsen burners, in which the calorific effect of the gas is depended upon for the purpose of heating a substance to incandescence, such as the type of burner and mantle commonly known as the Welsbach lamp. In these lamps the illuminating value is of less importance than the calorific value." I am very much interested in these figures and would like to know if Mr. Dunbar can verify them or give me an idea where they were secured. The most favorable figures I have had the privilege of going over so far, in investigations along this line, gave 10 to 15 per cent. of the outlets as using mantle burners, and 85 or 90 per cent open flames. Now, those figures were based on the actual count in a number of gas towns through an inspection of the houses. I have believed that the percentage was very small throughout the country, because gas companies, as a rule, have given very little attention to this lighting question. It has been largely left with the consumer, the dealer and the department store. I regret very much that I was unable to be present this morning, as I understand some very good points were brought out, especially the conclusion that gas companies cannot afford to use anything but the best material. When you consider the very small difference in cost between good mantles and burners and the cheaper kind, and compare them on the basis of the cost per unit of light or illumination, you will find that the difference in total cost is greatly in favor of the better goods. We have found in tests that a 17 to 18-candle power water gas, having a value of 600 to 650 B.T.U., gives about the best results. The matter of gravity is quite as important as pressure, and, so far as lamp adjustment is concerned, may be more serious. A burner may take care of a wide pressure range but be quickly affected by a gravity change. These are all points which should be considered in the delivery of good service.

Mr. J. J. Campbell—He states that he has 85 per cent. open flames. I have charge of three towns, and I take a little exception. He speaks of all over the State. Our mantle burners are about 96 to 97 per cent.

The President You are to be congratulated. I am very much interested in the statement of Mr. Macbeth in reference to the best quality of gas for incandescent mantles being 600 to 650 B.T.U., because before he arose I intended to ask him if he had any information as to what the effect would be of using 500 B.T.U., or even lower, on incandescent mantles. Have you any information on that, Mr. Macbeth?

Mr. Macbeth—I do not know I can answer that question exactly. Within the last 2 years, both in the work in our laboratory and that of the United Gas Improvement Company, statements of gas conditions are taken and recorded with each photometric investigation on mantles—the gravity of the gas, its calorific value, the pressure and the quantity consumed are all taken. We have been endeavoring to get a closer connection between the calorific value of the gas and candle power of a mantle. You know there is little or no connection between the candle power of gas and the heat units, but as to just what connection there may be between the calorific value of the gas and the candle power of a mantle has not been settled. De Ville has shown that, with a burner properly constructed for the particular kind of gas you are using, the candle power of the mantle will follow the calorific value of the various gases used. I think possibly I might illustrate that in this way: We know we get about 20 per cent. more light per mantle with natural gas on a lower consumption than we do with artificial gas. Now, on the basis of calorific value, we should get about 50 per cent. more light, but I have no doubt that, with natural gas and burners as well designed and constructed for that gas as the burners for artificial gas have been, we could raise the light production. At this time, however, the natural gas burners are mostly artificial gas burners adapted for use with natural gas. A great deal of investigation is being made along those lines, and I believe within a year we will reach conclusions somewhat more definite. Mr. Graf's question was as to the effect when using a gas of 500 B.T.U.

or less. I believe the result would be practically the same as with a 650 B.T.U. gas, excepting that the consumption would be increased proportionately possibly 25 or 30 per cent.

The President—Does any gentleman care to discuss this paper? If not, we will close the discussion. I will call on Mr. Dunbar first.

Mr. Dunbar—Mr. President and Gentlemen of the Association: In answer to Mr. Macbeth I will state my assertion that less than 10 per cent. of the gas used was dependent for efficiency on its candle power was on my part merely an assumption largely based upon observation. The company that I represent is owned by the Chicago Commonwealth Electrical Company, and upon assuming charge of our properties, Mr. Insull, having been President of the National Electric Light Association, they thought there was no light that was to be used by progressive citizens excepting the electric light. The result was that the electrical end was pushed and the gas end for lighting purposes was relegated. I believe I am safe in the assertion that 70 per cent. of the gas we sell is sold for fuel purposes. We send out during the summer 75 per cent. more gas than we send out during the winter months. The managers of our company, however, have experienced a little change of heart, and, instead of pushing the electrical end, they are now advocating gas as strongly as they formerly did electricity, so that our gas consumption for light is largely increased. In the town that I represent it is very seldom indeed that you find a gas burner in use that is not an incandescent burner. You see no open flame burners in use in the stores, and no living room lighted with any other than an incandescent burner. Everywhere that gas is used for any considerable length of time, we recommend the introduction of an incandescent burner. It may be true that the observation is correct, and it may apply to our own town, that 85 per cent. of the burners installed are open flame burners, but they are installed in those portions of the house that are used infrequently. In fact, I recommend that, where a burner is likely to be used but a few hours in the course of a month, that the open flame burner be installed. It is only on my own observation that I base this assertion, but I believe my observation will justify that over 90 per cent. of the gas we sell owes its efficiency to the calorific value. Digressing a little, I will state that in our town we have a man whose duty it is to inspect our lighting installments and to make such recommendations as he thinks might improve the service. He puts on burners free of charge and sells and installs mantles at cost. From him I have gathered the information that it is but seldom indeed that an open flame burner is used for any length of time during any day in the year. In fact, they are only used in those parts of the residences which the people seldom occupy.

Mr. Davis—I have very little to say, except I think either Mr. Macbeth or myself got a wrong impression from that part of Mr. Dunbar's paper where he says a small per cent. (perhaps, 10), of the gas used depends for its efficiency on its candle power. As I understand Mr. Macbeth's argument, he took that to mean 10 per cent. of the total amount of gas used for lighting. I believe Mr. Dunbar meant that it was 10 per cent. of the total amount of gas used.

Mr. Dunbar—That is true.

Mr. Davis—I believe Mr. Dunbar is correct in that statement. The gas used in stoves is burned in Bunsen burners, so that you would have to include all the gas used in that 90 per cent.

Mr. Macbeth—I desired information on Mr. Dunbar's statement made in the paper. Both the explanations are satisfactory to me. Mr. Dunbar brought out the point I desired to have more clearly stated in the record, so that some of our friends in the East could see what you are doing in the West. I am very pleased indeed to have this in the "Proceedings," and to know that you are doing things so well here in the West.

The President—I certainly think a vote of thanks is due to Mr. Dunbar and to Mr. Davis for this valuable work. In fact, I am so impressed by it that it does not seem right to me to stop the matter at this point. I think, with the start these gentlemen have made, the work ought to be continued, and I would suggest a motion to the effect that these gentlemen be requested by the Association to continue this work through the coming year. By that I do not mean that they are to devote their own time to making all the tests. The tests submitted in this paper were all made at the plant of the Indianapolis Gas Company. I believe that we should have comparative tests made at every plant in this State. My idea would be to have Mr. Dunbar and Mr. Davis simply supervise the work and get the members to cooperate and gather the information. That, I feel sure, would be of great value in the near future. I have in mind that if we come under a Public Service Commission we would be invited to offer suggestions, and any information we have of this character would undoubtedly be a great help in influencing any rules that would be made by a Commission.

[Moved by Mr. Strain, seconded, put to vote and declared adopted.]

Mr. Strain—And may I add we express a vote of thanks for the paper and the work these gentlemen have done?

Mr. Battin—I think that is a very good suggestion, because, as has been brought out, there is no definite relation between heat unit value and candle power. It is especially true that, if this work is taken up by small companies, there is an even less marked ratio, and if the Commission or authority are brought to see (especially in the case of the smaller companies which make up a large number of those with whom they will have to deal) that no relation can exist between the candle power and the heat units, it will be much easier for us to get the State to establish the heat unit basis.

(To be Continued.)

Use and Abuse of Machinery.

[By "ENGINEER."]

An engineer needed a pulley of a certain diameter for keying to a shaft for driving a 4-inch leather belt. The only available wheel of this size had a bore a trifle too large for the shaft, and rather than order a new wheel of the proper dimensions, the engineer wound wire about the shaft, as in Fig. 1. Then he placed the wheel-hub on the built-up portion and managed to get the wheel secure with 3 set-screws; but the wire failed to retain itself in position, and after a few weeks some pieces of it projected, as at *A* and *B*. Soon the wire became tangled with near-by objects, and in a few days it was nearly all pulled out. Then the wheel wobbled and the shafting had to remain idle until a wheel of proper measurement was obtained and properly keyed to the shaft.

In another case the plant mechanician had a split shaft, like that in Fig. 2, to fix. The shaft was expanded, as at *C*, but the right way was to have cut out this length of shafting at the couplings and substitute a next section. Instead the party laboriously wrought 3 metal rings and drove them over the fractured line of shafting, as in Fig. 3. Of course, the split was closed and the shafting held for a time, but in 3 months the rings again worked loose and a new section of shafting was obtained by the superintendent, who did not want any more fooling with the shafting.

Another case that came to the notice of your correspondent was in a manufacturing establishment. The set-screw of a gear had been turned on to a shaft so often that the point of the set-screw had cut into the metal, as in Fig. 4, at *C*. The local workman got on the job and tediously set a ring in the space which he recessed to do away with the gouged place, as in Fig. 5. As long as the ring held fast all went well, but when the ring freed itself, and revolved along with the point of the set-screw *D*, of Fig. 4, then the whole combination was ordered off by the foreman and a new section of shafting was substituted, as should have been done at first.

In another instance a party tried to make a shafting of steel rough, for a wooden wheel bushing, by chipping the shaft with the point of a cold chisel, as in Fig. 6. It certainly is odd as to what some men do who ought to know better, and it is surely strange that any man, knowing anything about the power of a frictional contacting surface, should try to roughen up a steel surfacing. When the boss saw what had been done he was justly angered, and gave the man a few lessons in how to set a frictional contacting surface wooden wheel on a shaft by screwing up the clamping bolts as should be done.

Another fellow who thought he could throw off a belt from a revolving wheel with a broom found out that there were better ways of doing the "stunt" when the broom caught beneath the belt next the wheel and wrenched his wrists, and dropped the handle just in time to avoid getting thrown. The condition assumed by the broom is shown in Fig. 7.

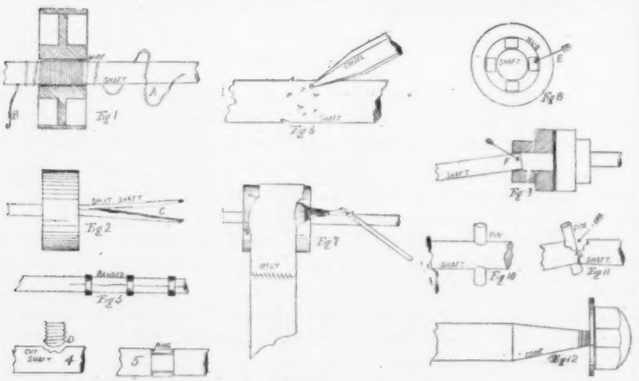
The boss then gave instructions to have the right kind of a belt-shifting device made for the belt.

Another party, in trifling with a flange for a shaft, found the hub was much too large. Therefore, he proceeded to fill out the vacancy by utilizing 4 steel keys, as at *E*, Fig. 8. The keys were driven in securely and the parts held for 6 months, at the end of which time the man found his 4 keys on the floor with the flanged device hanging loosely on the revolving shafting. Then he got a hub of proper size for correctly keying to the shaft.

Another machinist of a plant found that the shaft end for mating into the opening of the coupling of a line of driving shafting was a little short. Being in a hurry he did not seek to correct the error. Instead of that he fastened the stub of the shaft, at *F*, Fig. 9, inside the opening of the coupling as best he could and was satisfied; but when the shaft end pulled out, a little time after, and the works were obliged to shut down until a new length of shafting was put in, this man got a few remarks from the section overseer.

I saw a party try to drive a steel pin into a driving shaft, as in Fig. 10. If you get a right fit, all right; if not, look out for fractures. In driving the pin with a heavy hammer in this case, the shaft was split, as in Fig. 11, for the reason that in this instance the shaft metal was inferior. I saw a coned-end nut and bolt contrived, as in Fig. 12, for sustaining a gear to the terminal of a line of shafting. It proved a feeble mode, for the threads of the nut-head gave out prematurely.

The nut worked off and, of course, the coned hub of the gear allowed the latter to slip off. In putting a nut in position in a case



like this, it is advisable to use a lock nut; or the single nut can be pinned or headed on.

The Old Style and the New.

The illustration quite vividly shows the differences existing between the old and the new styles of gas cookers. The structure to

left of picture shows a good working sample of the A orn Short Cabinet type of gas range, as now on the market, while the pigmy on the right is an exact reproduction of the "Gas Retort" Cooker, as this was made by the Barstow Stove Company, of Providence, R. I., in the early eighties. Writing of gas cookers and Providence, R. I., recalls to mind the curious fact that the first separate establishment for the showing of up-to-date gas appliances by any gas company in the country was that set up by the Providence Gas Company, at the instigation of its Engineer and Treasurer, Mr. A. B. Slater, in 1882-3.

Items of Interest
FROM VARIOUS LOCALITIES.

THE Macon (Ga.) Gas Light and Water Company has purchased the location known as the "Wells' property," well situated in the business section, on Second street. It is intended to construct thereon a modern office building, at an expenditure of not far from $50,000.

MR. J. K. DIMMICK, of the Dimmick Pipe Works, is the leading spirit in the syndicate that recently purchased the plant and franchise of the Huntsville (Ala.) Gas Company.

AT the annual meeting of the Waterbury (Conn.) Gas Light Company the officers elected were: Directors, Chas. H. Field, F. C. Sherman, George E. Terry, F. W. Pardee, F. E. Field, F. J. Wooster, E. A. Pendleton, James S. Elton and W. B. Merriman; President, Geo. E. Terry; Treasurer, F. E. Field; Secretary, F. E. Field.

MRS. ANNA R. MIDDLEMAS, of West Newton street, Boston, Mass., recently pleaded guilty in court to the charge that since 1904 she had been using gas in the lodging house kept by her for 7 years without having paid the Boston Gas Company anything for it. She was released under pledge to pay to the Company the amount of its claim—something over $150.

THE Western States Gas and Electric Company announces that by the 1st of May the selling rate for all gas supplied in its territory at Stockton, Cal., shall be $1 per 1,000 cubic feet. Both natural and artificial gas is sold in Stockton, and the current rates are respectively: Artificial, $2 per 1,000, less 25 per cent. per 1,000 for payment in 10 days; natural, $1 per 1,000, less 5 per cent. for payment in 10 days.

A CORRESPONDENT in Marshalltown, Ia., writing under date of the 9th inst., incloses the following: "A gas plant for Eldora, Ia., seems assured; for Mr. J. J. Donelan, General Manager of the Waverly (Ia.) Gas Company, who has looked over the situation, says that place is, at the least, a most practical town for the establishment of a gas works. Under the plan at present preposed it is the intention of the parties in interest to construct a plant on like lines to those at Waverly and Decorah, which would be ample to insure good gas service at Eldora. While there has been some talk that the proposed gas company would be put in the field, joined to a new electric company, the talk is more than likely baseless, for the officials of the Park Dam Power Company deny that negotiations toward such end are underway.—T. R. P."

MR. A. M. BOWMAN, Secretary of the Borough of Camp Hill, Pa., has acknowledged the communication from the proprietors of the Belvoir (Pa.) Gas Company, accepting formally the ordinance approved by the Burgesses of that place, authorizing the Company to lay its pipes in the named district. The ordinance directs that the Company shall supply gas to Camp Hill within 9 months after the acceptance of the terms.

THE last number of "Fliegende Blatter" contained these "few lines," which rather go to show that under certain conditions meter readings are implicitly held or regarded as positive evidnce: "Frau Huber, on the advice of her physician, spent the month of October in the South. On her return her husband related how he spent the time during her absence: 'Oh, the long, long, evenings,' said he, 'at 5 o'clock I lighted the gas and then sat in the library, and read, read!' Just then the maid brought a slip, handed it to her mistress and retired. The mistress read it, tossed it to her husband, exclaiming, 'Wretch,' going out from the room in fine passion. On the slip was printed this statement: 'Karl Huber, to the City Gas Company, Dr.: To gas furnished during the month of October, 15 cents?'"

THE application of Mr. Frank M. Hays, of Binghamton, N. Y., acting for certain capitalists of that city, who are desirous to secure the right to operate a gas supply for the villages of Union and Endicott, N. Y.,—these settlements adjoin each other—will be considered to-day.

MR. E. M. WALLER, General Manager of the Citizens Railway and Light Company, of Muscatine, Ia., denies positively the truth of any assertion that the Company will voluntarily accede to the city ordinance establishing a 90-cent gas rate. The case will be tried out to the end. So far the Company has retained Messrs. H. I. Lea and W. A. Baehr as its expert staff, and, in so far as we at present know, the city's sole "expert" reliance is Mister W. D. Marks.

So that recriminations would be out of the question, Mr. Thomas Norman, who accepted the democratic nomination for Mayor, resigned the position of Manager of the Peoria (Ills.) Gas and Electric Company, in the service of which corporation he has been active since 1890.

THE Chicago *Record-Herald* of recent date says that the present active buying of shares in the Cicero (Ills.) Gas Company is traceable to a plan under consideration of the management of the Peoples Gas Light and Coke Company, of Chicago, to take over the Cicero-Northwestern gas combination as soon as the rate question has been determined by the Chicago authorities. It is understood that the plan is to double the stock of the Northwestern Company, taking it in at

par in Peoples. It naturally will take quite a while to make out the details of the merger, although this is made much easier through the fact that the Peoples' controllers are now well really far in control through ownership in the Northwestern Company.

THE Westchester (N. Y.) Lighting Company, under an invitation to tender for the public lighting of its district, in so far as that is done by means of gas lamps, agreed to maintain lamps of the Welsbach type at the rate of $28 each per annum, provided not less than 2,500 lamps were allotted under the contract.

THE New York Public Service Commission for the Second District, after due hearing and consideration of the testimony adduced, has given preliminary consent to the appeal of the Geneva-Seneca Electric Company to purchase the electric plant heretofore operated by J. Q. Howes' Sons, Phelps, N. Y. The Commission also assents to the agreement for consolidation entered into between the respective proprietors of the Geneva-Seneca Electric Company and the Wayne County Gas and Electric Company.

MR. J. F. O'DONNELL has resigned from the force of the Northern Indiana Gas and Electric Company's South Bend division, in order to take charge of the meter repair shops of the Laclede Gas Light Company, St. Louis, Mo. Mr. O'Donnell had charge of the meter repair shops of the Indianapolis Gas Company, going to that concern from the factory of Messrs. Helme & McIlhenny in 1888. He has just completed the course conducted by the American Gas Institute through its Practical Class.

THE Gas Machinery Company, of Cleveland, O., has been awarded a contract by the Milwaukee (Wis.) Gas Company for the installing in its plant of an 11-foot water gas apparatus of the standard, double-superheater type.

WE are indebted to "T. R. B.," of Terre Haute, Ind., for the following mention respecting the death of Mr. W. H. Brown: "I have to inform you of the death of Mr. W. H. Brown, who passed away at Macomb, Ills., the morning of February 5th. Deceased was an expert gas meter maker, whose reputation in that industry was international. He was concerned in the meter business for well over 50 years, and came to this country from England in 1858. Industrious and likeable, he will be missed sadly by a large circle of friends. He is survived by his widow and 9 grown children. I might add that his estate is under the administration of Mr. Thomas R. Brown, 129 So. First street, Terre Haute, Ind."

JUST now it looks that the authorities of Temple, Tex., will accede to the request of Messrs. St. John and Wallace, of Detroit, Mich., for an ordinance to govern the operation of a gas plant in the place named.

THE proprietors of the Ashtabula (O.) Gas Company are getting their house in order, with a view to extending their business. In that connection the Company is showing quite a bit of good citizenship. Some time ago the authorities decided to pave the thoroughfare known as West Prospect street, the paving material decided upon being of the brick type, and the Company notified the authorities that it would lay service pipes on both sides of the streets to all lots (stopping at the curb line) not at present built upon.

WE are indebted to "A. M. L." for the following mention respecting the annual meeting of the Providence (R. I.) Gas Company, which was held in the Company's office a few days ago: "In this report President J.W. Ellis stated that plans and estimates had been made for a building to be erected for the Company's use on the block of property purchased from the Crawford Land Company last year, which fronts at 84-89 Westminster street and 42-44 Exchange Place. In making the report he said that the present offices of the Company are entirely inadequate for the Company's business. The new building will not only accommodate the Gas Company's offices, but will be built sufficiently large for the rental of offices to other parties. In the financial statement made by the Company, which showed total assets of $5,679,778.23, as of January 1st, and liabilities of an equal amount, the site for the new building of the Company, being given a valuation of $140,500, the exact amount for which it was taxed at time it was purchased. Mr. H. D. Sharpe was elected Vice-President, to succeed Newton D. Arnold, resigned. The other officers chosen were: President and Manager, Jas. W. Ellis; Secretary and Treasurer, W. P. Nye; Assistant Secretary and Treasurer, Arthur F. Short; Directors, N. D. Arnold, J. W. Ellis, Isaac C. Bates, H. D. Sharpe, J. R. Freeman, C. F. Brown, Webster Knight, F. W. Matteson and W. L. Hodgman. The quantity of gas made in the year was 1,338,890,000 cubic feet, an increase over the previous year footing up 12.11 per cent. The distributing system was increased by the placing of 16¼ miles of mains, bringing the total up to 357 miles. The number of new services laid was 1,342 and 198 were relaid. A lease of a section of the property at Sassafras Point was made and agreed upon with the B. P. Clapp Ammonia Company, the proprietors of which have erected thereon works for the treatment of ammoniacal liquor, and a contract was executed whereby the Gas Company's ammoniacal liquid is to be pumped direct to the stills of the contractor at a price satisfactory to both parties, the agreement to run for 7 years. The Company's business is in altogether extremely satisfactory condition."

WE are indebted to Mr. W. F. Hart, General Manager, Washington (D. C.) Gas Light Company, for calling our attention to an important finding, recently made by the District of Columbia Court of Appeals, respecting defaults in candle power in the District as reported by the official inspector. It appears that when illuminating gas furnished by the Company is below 22-candle power, or contains impurities specified in the statutes, the Inspector of Gas and Meters must send notice forthwith to the Company. No penalty is incurred by the default of the Company unless it fails to correct the improper conditions within 24 hours. If the default occurs on two successive days the Company becomes liable to the penalty imposed by the statute of $100 for each day. Such view of the pure gas statute is that established by the District Court of Appeals, in an opinion recently rendered by Mr. Justice Van Orsdel, reversing the finding of the District Supreme Court in favor of the Company. The lower court held that the District was obligated to show that the alleged defect in the gas continued for a period of 24 hours. Mr. Justice Robb dissented in part from the finding of his associates on the Appellate Bench, in expressing the opinion that the interpretation given the statute defeats its apparent purpose. Justice Van Orsdel declares that all the law requires is an inspection some time during the 24 hours, and that good administration would suggest several tests. If impurity or lack of candle power were discovered the Company must be notified, and if the gas on the following day's inspection comes up to the legal requirements the Company must be considered to have responded to the notice, and no penalty can attach. If, however, the default is still apparent in the second inspection the Court held that the Company has violated the law and has laid itself open to the fine."

THE main system of the Waterbury (Conn.) Gas Light Company will be extended this season by the placing of 5 miles or so of pipe. The plan notably calls for the extension through Southmayd road from East Main street.

THE new plant for Newton, Ia., is to be of the Tenney carburetted water gas type, and is to be constructed under the direction of Mr. G. I, Vincent.

MR. W. S. NEELEY, Manager of the Wichita (Kas.) Natural Gas Company, with headquarters in Independence, Kas., has resigned that berth. The property has been acquired by Mr. T. U. Barnsdell, acting for the Kansas Natural Gas Company.

AT the annual meeting of the Fort Worth (Tex.) Gas Company the the officers elected were: President, George Armstrong; Treasurer, Noah Harding; Secretary, O. K. Shannon; General Manager, C. W. Sears.

GENERAL MANAGER O'BRIEN, of the Helena (Ark.) Gas Company, has been authorized to reconstruct the plant of that concern; and, if the whole truth were quickly told, it might be remarked that the general orders in this respect were issued none too soon.

THE Legislature of Rhode Island is considering a proposition that has for its object the placing of the lighting interests of the State under the control or supervision of a commission to comprise three members, who may employ experts to assist them.

THE Peoples Gas Light and Coke Company, of Chicago, has issued a most interesting leaflet-pamphlet upon values of several large installations recently made in that city, that bring out plainly many practical "Uses of Smokeless Fuel in the Industrial Field."

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MONDAY, MARCH 20, 1911.

The Market for Gas Securities.

The speculators (that is, those who usually deal in active shares and are satisfied with quick turns) have seemingly turned their attention to Consolidated Company's shares, which likely is the most accurate foretelling portent that a brisk and expanding market is due to these particular securities. There was active and summary trading in the specialty last week, and the net result is a gain in the week of 3 points or more. The opening to-day (Friday) was made at 143 to 143½.

Brooklyn Union is in good demand, at figures showing no particular change. The undertone, however, is all in favor of a substantial advance. Peoples, of Chicago, stands up pretty well under the Carter drive, and Lacledes are also strong.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

115 BROADWAY, NEW YORK CITY.

MARCH 20.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share:

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked*
Consolidated Gas Co.	$78,177,000	100	143	143¼
Central Union Gas Co.—				
1st 5's, due 1972, J. & J.	8,000,000	1,000	102	103
Equitable Gas Light Co.—				
Con. 5's, due 1932, M. & S.	1,000,000	1,000	—	105
Mutual Gas Co.	3,500,000	100	155	165
New Amsterdam Gas Co.—				
1st Con. 5's, due 1948, J. & J.	11,000,000	1,000	100	101½
New York & Richmond Gas				
Co. (Staten Island)	1,500,000	100	35	50
1st Mtg. Gold Bds. 5 p. ct.	1,000,000	—	98½	100½
New York and East River—				
1st 5's, due 1944, J. & J.	3,500,000	1,000	103	105
Con. 5's, due 1945, J. & J.	1,500,000	—	100	102
Northern Union—				
1st 5's, due 1927, J. & J.	1,250,000	1,000	94	100
Standard	5,000,000	100	—	75
Preferred	5,000,000	100	70	100
1st Mtg. 5's, due 1930, M. & N.	1,500,000	1,000	100	105
The Brooklyn Union	15,000,000	1,000	140	141
1st Con. 5's, due 1948, M. & N.	15,000,000	—	106¾	107
Yonkers	299,650	500	130	—
Out-of-Town Companies.				
Bay State	50,000,000	50	⅝	¾
" Income Bonds	2,000,000	1,000	—	75
Binghampton Gas Works	450,000	100	—	—
" 1st Mtg. 5's	500,000	1,000	95	100
Boston United Gas Co.—				
1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	5	8
Bonds, 5's	5,250,000	1,000	59	60
Capital, Sacramento	500,000	50	—	35
Bonds (6's)	150,000	1,000	—	—
Chicago Gas Co. Guaranteed Gold Bonds	7,660,000	1,000	104	106¼
Cincinnati Gas and Electric Co.	29,500,000	100	92	93
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	96	98
Columbus (O.) Gas Lt. & Heating Co.	1,682,750	100	90¼	91
Preferred	3,026,500	100	75½	80
Consumers, Toronto	2,000,000	50	200	204
Consolidated, Baltimore	11,000,000	100	106½	—
Mortgages, 6's	3,600,000	—	89	100
Chesapeake, 1st 6's	1,000,000	—	—	—
Equitable, 1st 6's	910,000	—	—	—
Consolidated, 1st 5's	1,490,000	—	—	112
Consolidated Gas Co. of N. J.	1,000,000	100	15	—
Con. Mtg. 5's	976,000	1,000	92	95
Bonds	75,000	—	—	100
Denver Gas and Electric	3,500,000	—	102	105
Detroit City Gas Co.	6,580,000	—	—	50
" Prior Lien 5's	5,619,000	1,000	97	100½
Detroit Gas Co., 5's	381,000	1,000	75	80
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	—	101
Essex and Hudson Gas Co.	6,500,000	—	39	40
Fort Wayne	2,000,000	—	—	—
" Bonds	2,000,000	—	55	—
Grand Rapids Gas Light Co., 1st Mtg. 5's	1,350,000	1,000	100	101
Hartford	750,000	25	190	200
Hudson County Gas Co., of New Jersey	10,500,000	—	112	113½
" Bonds, 5's	10,500,000	—	103	103½
Indianapolis	2,000,000	—	78	83
" Bonds, 5's	2,650,000	—	104½	105
Jackson Gas Co.	250,000	50	82	—
" 1st Mtg. 5's	290,000	1,000	97	100
Kansas City Gas Light Co., of Missouri	5,000,000	100	—	36
Bonds, 1st 5's	3,822,000	1,000	102	104
Laclede Gas Co., St. Louis	10,000,000	100	111¾	112
Preferred	2,500,000	100	91½	102
Bonds	10,000,000	1,000	102½	103
Lafayette Gas Co., Ind.	1,000,000	100	—	60
Bonds	1,000,000	1,000	60	65
Louisville	2,570,000	50	143	145
Madison Gas and Electric Co.				
" 1st Mtg. 6's	400,000	1,000	106	106¾
Massachusetts Gas Companies, of Boston	25,000,000	100	93	93¼
Preferred	25,000,000	100	96½	96¾
Montreal Gas Co., Canada	2,000,000	100	218	218¼
Nashville Gas Light Co.	1,000,000	100	110	—
Newark, N. J., Con. Gas Co.	6,000,000	—	56	58
Bonds, 6's	6,000,000	—	137	138
New Haven Gas Co.	2,000,000	25	200	—
Peoples Gas Lt. & Coke Co., Chicago	25,000,000	100	106	106¼
1st Mortgage	20,100,000	1,000	—	—
2d "	2,500,000	1,000	104	—
Rochester Gas & Electric Co.	2,150,000	50	88	—
Preferred	2,150,000	50	118	—
Consolidated 5's	2,000,000	—	104¾	105½
San Francisco Gas Co., Cal.	15,500,000	—	—	—
St. Joseph Gas Co.—				
1st Mtg. 5's	1,000,000	1,000	100	102
St. Paul Gas Light Co.	2,500,000	100	—	—
1st Mortgages, 6's	650,000	1,000	113	116
Extension, 6's	600,000	1,000	112½	115
General Mortgage, 5's	3,447,000	1,000	90	95
Syracuse Gas Co., N. Y.	1,975,000	100	50	55
Bonds	2,047,000	1,000	100	104
Washington (D. C.) Gas Co.	1,600,000	200	399	400
1st Mortgage, 6's	600,000	—	—	—
Western Gas Co., Milwaukee	4,000,000	—	—	—
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EXAMINATION AND VALUATION OF PUBLIC UTILITY AND POWER CORPORATIONS.
ADVICE AS TO CONSTRUCTION AND MANAGEMENT.

DIVIDEND NOTICE.

OFFICE OF THE UNITED GAS IMPROVEMENT CO., N. W. CORNER BROAD AND ARCH STS., PHILADELPHIA, March 8, 1911.

The Directors have this day declared a quarterly dividend of 2 per cent. (one dollar per share), payable April 15, 1911 to stockholders of record at the close of business, March 31, 1911. Checks will be mailed.

1866-5 LEWIS LILLIE, Treasurer.

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By Young Man as Working Manager of Small Company.

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Position Wanted.

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WANTED,
Superintendent,

Combined coal gas and electric plant; also distribution of both. Address, "R. L. D.,"

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WANTED,

First-Class, Experienced Gas Salesman.

Liberal salary, or salary and commission. Only first-class, experienced salesman, with proven record, need apply. Good territory. Address,

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866-2 WASHINGTON, IND.

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Superintendent

Of electric plant, who is familiar with generating details, and to work up power prospects.

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1866-3 Care this Journal.

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A sober, steady, married man, who can get results. State age, experience, references and salary required.

Address, "WATER GAS MAKER,"

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A large gas and electric light company wants three mechanical engineers and one water gas maker. Good opportunities for advancement for right men.

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Great Opportunity

FOR

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1866 tf Care this Journal.

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CONSULTING ENGINEER,

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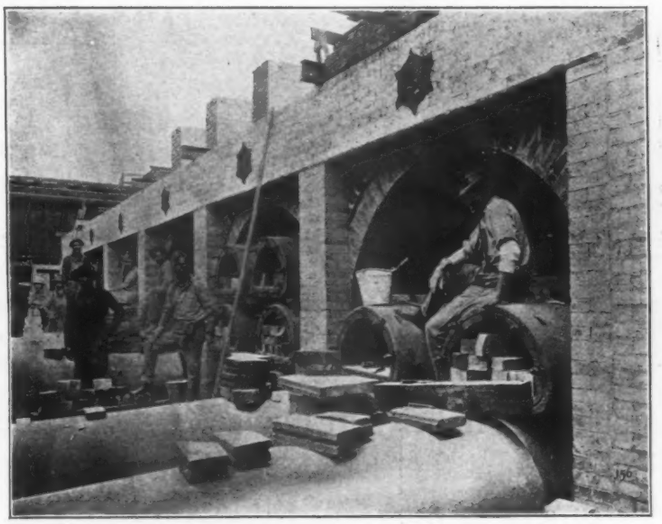

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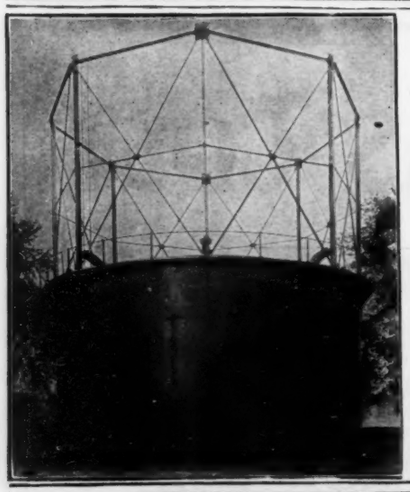

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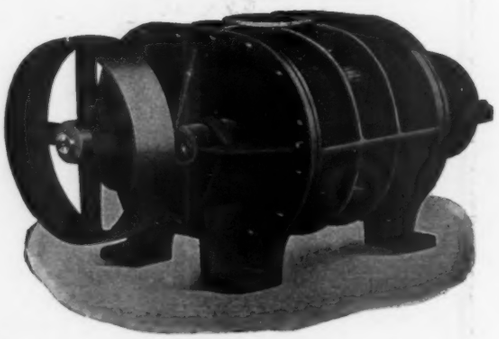

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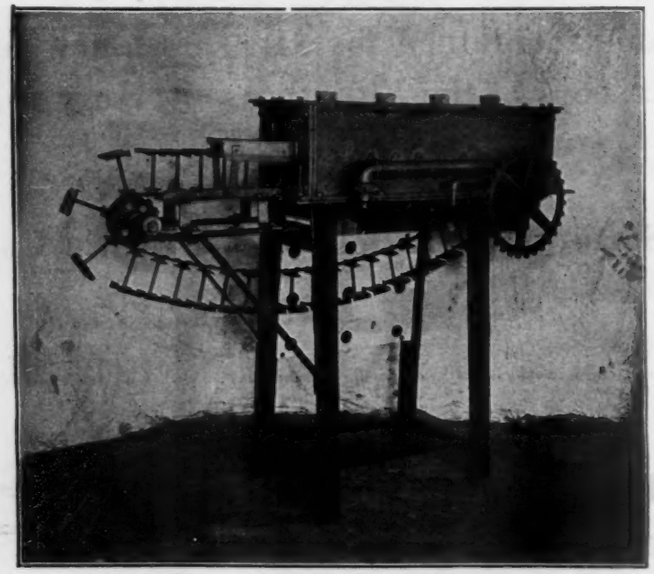

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TIME was when stores at night were dingy, full of shadows, dark nooks and corners---but all that belongs to an age that is past.

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Once the night gloom of the retail store was dispelled by a few scattered, flickering tallow dips. Later the smoky, explosive kerosene lamp came into general use, and while it was an improvement, the idea of store lighting was still a narrow one---"**something to see by**"---that's all!

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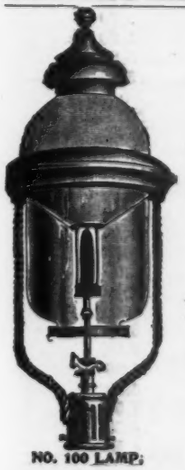

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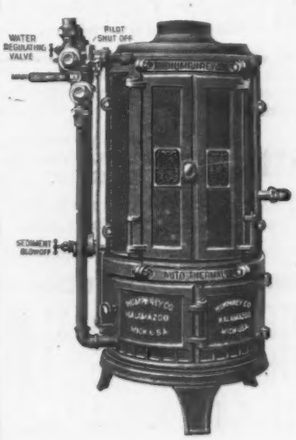

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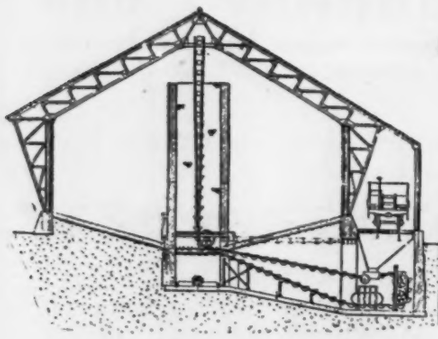

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PUBLIC LIGHTING TABLE FOR MARCH, 1911.

[Communicated by The American Meter Company.]

Day of Week.	MOONLIGHT SCHEDULE.		
	Date.	Light.	Extinguish.
Wednesday	1	6.20 P.M.	5.30 A.M.
Thursday	2	6.20	5.30
Friday	3	6.20	5.30
Saturday	4	6.20	5.30
Sunday	5	10.30	5.20
Monday	6	11.40	5.20
Tuesday	7	1.00 A.M. F.Q.	5.20
Wednesday	8	2.00	5.20
Thursday	9	3.00	5.20
Friday	10	3.50	5.20
Saturday	11	4.30	5.20
Sunday	12	5.00	5.20
Monday	13	No L.	No L.
Tuesday	14	No L. F.M.	No L.
Wednesday	15	No L.	No L.
Thursday	16	6.40 P.M.	9.00 P.M.
Friday	17	6.40	10.00
Saturday	18	6.40	11.10
Sunday	19	6.40	12.10 A.M.
Monday	20	6.40	1.10
Tuesday	21	6.40	2.10
Wednesday	22	6.40 L.Q.	3.00
Thursday	23	6.40	3.50
Friday	24	6.40	4.40
Saturday	25	6.40	5.00
Sunday	26	6.50	4.50
Monday	27	6.50	4.50
Tuesday	28	6.50	4.50
Wednesday	29	6.50	4.50
Thursday	30	6.50 N.M.	4.50
Friday	31	6.50	4.50

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MEETING TIMES OF THE VARIOUS GAS ASSOCIATIONS.

American Gas Institute.—Annual meeting, October, 1911. St. Louis, Mo. Officers: President, Donald McDonald, Louisville, Ky. Secretary, A. B. Beadle, 29 West 39th st., N. Y. City.

Canadian Gas Association.—Annual meeting, June, 1911. ————. Officers President, Arthur Hewitt, Toronto, Ont.; Secretary and Treasurer, John Keillor, Hamilton, Ont.

Empire State Gas and Electric Association.—Annual meeting, Nov., 1911. New York City. Officers: President, C. R. Huntley, Buffalo, N. Y.; Secretary, C. H. B. Chapin, 29 W. 39th street, New York City.

Guild of Gas Managers of New England.—Annual meeting, December. Young's Hotel, Boston; monthly meeting, second Saturday. Officers: President, A. K. Quinn; Newport, R. I.; Secretary, Walter G. Africa, Manchester, N. H.

Illinois Gas Association.—Annual meeting, time, March, Chicago, Ills. Officers: President, A. S. Harrington, Chicago, Ill.; Secretary-Treasurer, C. B. Strohn, Elgin, Ill.

Illuminating Engineering Society.—Annual meeting, Oct. Chicago, Ill., 1911. Meetings of Sections, monthly. Pres't, A. E. Kennelly, Boston, Mass.; Secretary, Preston S. Millar, 29 W. 39th street, N. Y. City. Sections: New York: Secretary, Albert J. Marshall, 36 West 39th street. New England, Secretary, W. S. Farrow, 1240 Massachusetts avenue, Cambridge, Mass. Philadelphia, Secretary, G. B. Muth, 1000 Chestnut street Chicago, Secretary, F. H. Bernhard, Marquette Building.

Indiana Gas Association.—Annual meeting, Jan. 17 and 18, 1912, Indianapolis. Officers: President, S. E. Mulholland, Fort Wayne; Vice-President, Howard L. Olds, Indianapolis; Secretary-Treasurer, Philmer Eves, Indianapolis.

Iowa District Gas Association.—Annual meeting, time, June, 1911, ————. Officers: President, Austin Burt, Waterloo, Ia.; Secretary and Treasurer, G. I. Vincent, Des Moines, Ia.

Kansas Gas, Water and Electric Light Association.—Annual meeting, time, ———— Wichita, Kas. Officers: President, W. A. Scothorn, Hutchinson, Kas.; Secretary and Treasurer, J. D. Nicholson, Newton, Kas.

Michigan Gas Association—Annual meeting, time, Sept. 20, 21, 22, 1911; Detroit, Mich. Officers: President, A. P. Ewing, Detroit, Mich.; Secretary-Treasurer, Glenn R. Chamberlain, Grand Rapids, Mich.

Missouri Electric Light, Gas, Water Works and Street Railway Association.—Annual meeting, April 13 14 and 15, 1911; St. Louis, Mo. Officers: President, R. J. Irvine; Secretary and Treasurer, W. J. Cunningham, Springfield, Mo.

National Commercial Gas Association.—Annual meeting, December 5-12, 1911. Denver, Officers: President, C. N. Stannard, Denver; Secretary, Louis Stotz, 29 West 39th street, New York City.

Natural Gas Association.—Annual meeting, May 16, 17 and 18, 1911; Pittsburgh, Pa. Officers: President, John M. Garard, Columbus, O. Secretary, T. C. Jones, Delaware, O. Editor Wrinkle Department, F. W. Stone, Ashtabula, O.

New England Gas Association.—Annual meeting, third Wednesday in February, 1911; Boston. Officers: President, W. H. Snow, Holyoke, Mass.; Secretary-Treasurer, N. W. Gifford, East Boston, Mass.

Oklahoma Public Utilities Association.—Annual meeting, May 9, 10 and 11, 1911. Officers: President, E. C. Reynolds; Secretary, Galen Crow, Guthrie, Okla.

Pacific Coast Gas Association.—Annual meeting, Sept. 20, 21 and 22, 1911, Oakland, Cal. Officers: President, F. A. Leach, Jr., Oakland, Cal.; Vice-President, W. Baurhyte, Los Angeles, Cal.; Secretary-Treasurer, John A. Britton, 445 Sutter street, San Francisco, Cal.

Pennsylvania Gas Association.—Annual meeting, April, 1911, Reading, Pa. Officers President, J. H. Keppelman, Reading, Pa.; Secretary-Treasurer, William H. Merritt, Lebanon, Pa.

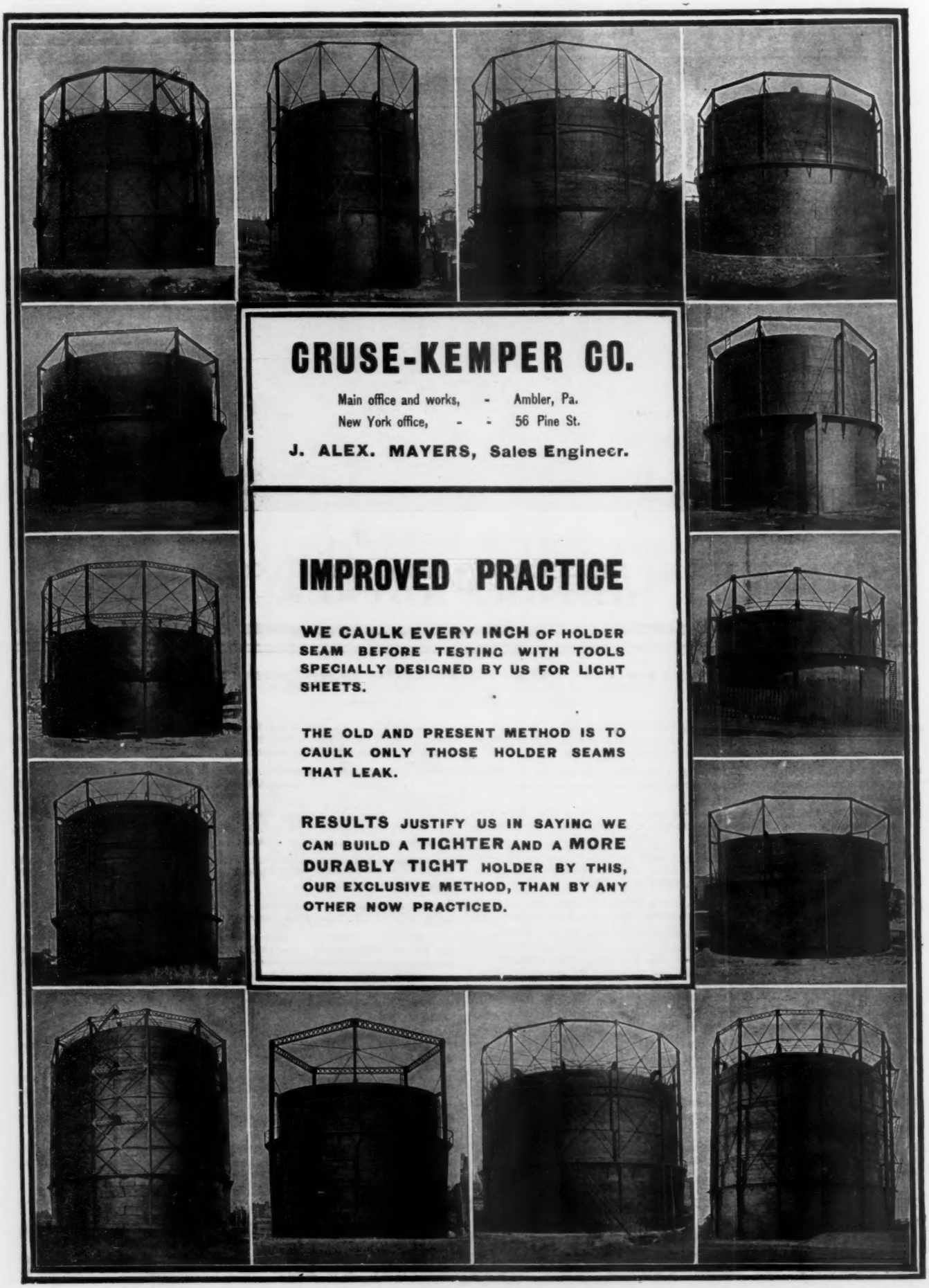
Society of Gas Lighting.—Annual meeting, December, 1911; monthly meeting, second Thursday. Place, New York City. Officers: President, Fred. S. Benson; Secretary, George G. Ramsdell, Waterbury, Conn.

Southern Gas Association.—Annual meeting, April 19-21, 1911, Montgomery, Ala. Officers: President, H. W. Frund, Salisbury, N. C.; Secretary-Treasurer, Jas. Ferrier, Rome, Ga.

Southwestern Electrical and Gas Association.—Annual meeting. April 27, 28, 29, 1911; Houston, Tex. Officers: President, W. B. Tuttle, San Antonio, Tex.; Secretary, D G. Fisher, Dallas, Tex.

Wisconsin Gas Association.—Annual meeting, May ————, 1911, Milwaukee, Wis. Officers: President, W. H. Winslow, Superior, Wis.; Secretary-Treasurer, Henry Harmon, Milwaukee, Wis.

Directory of American Gas Companies, 1910. Price, $5.00. For Sale by American Gas Light Journal, 42 Pine St. N. Y. City.



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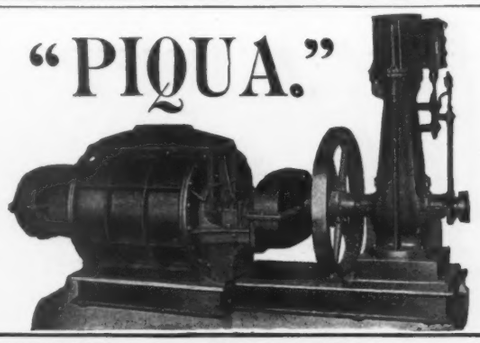

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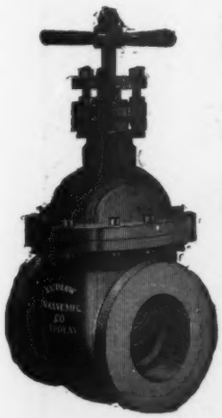

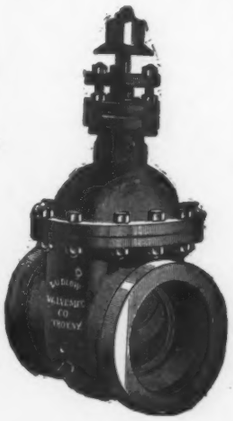

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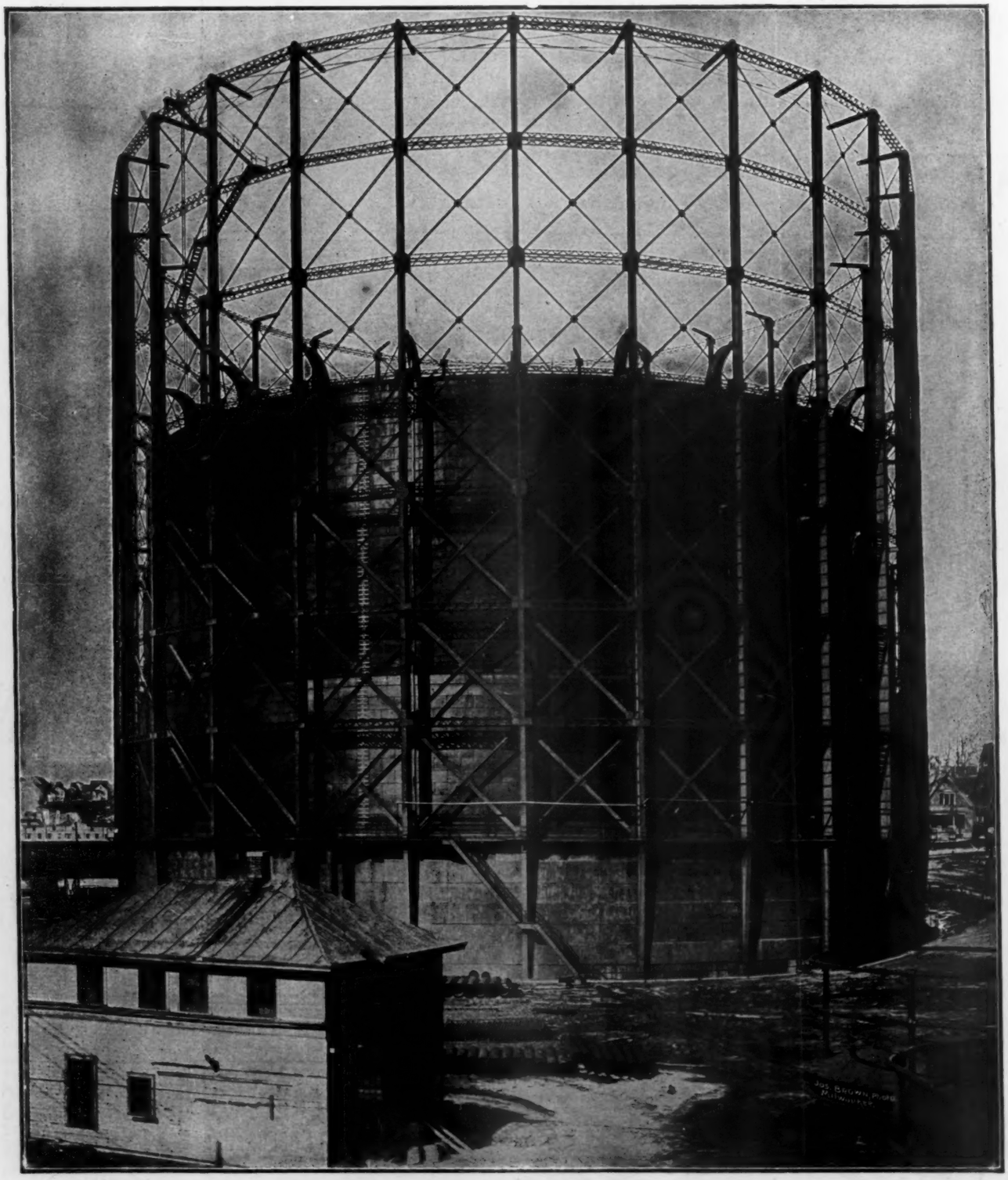

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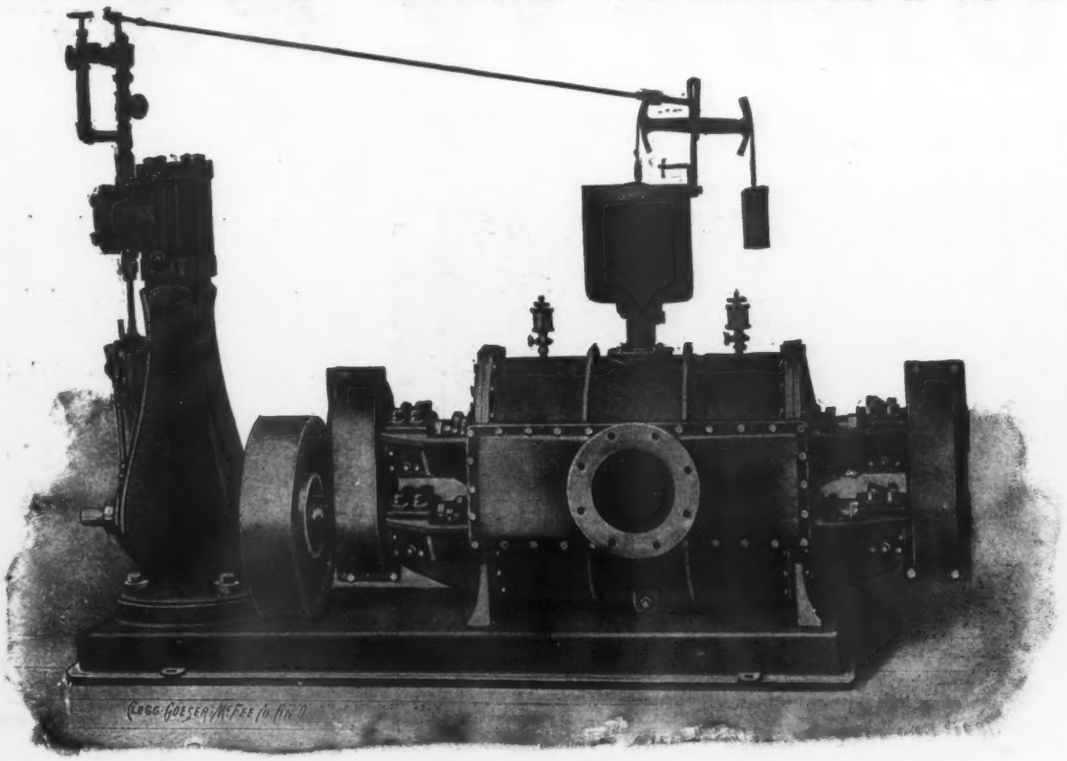

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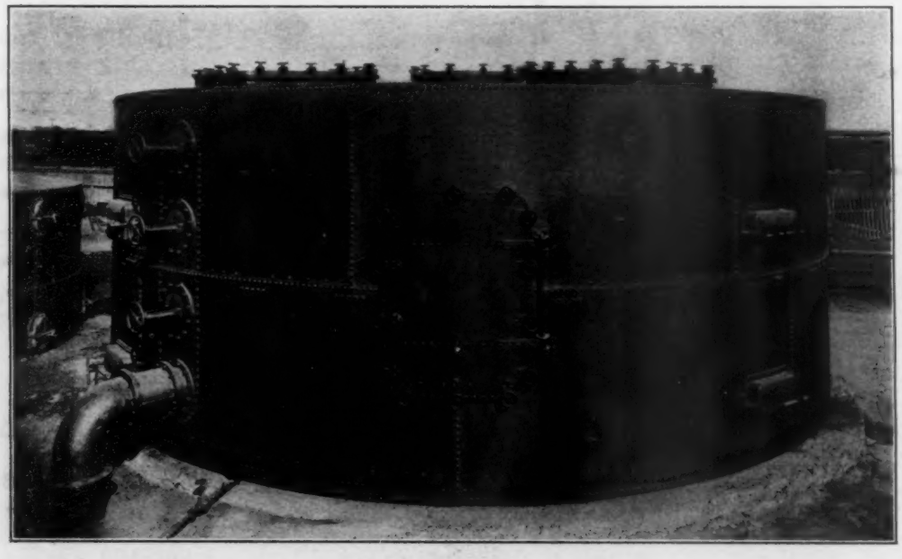

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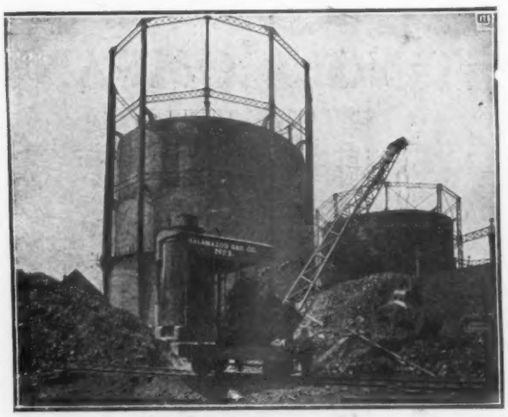

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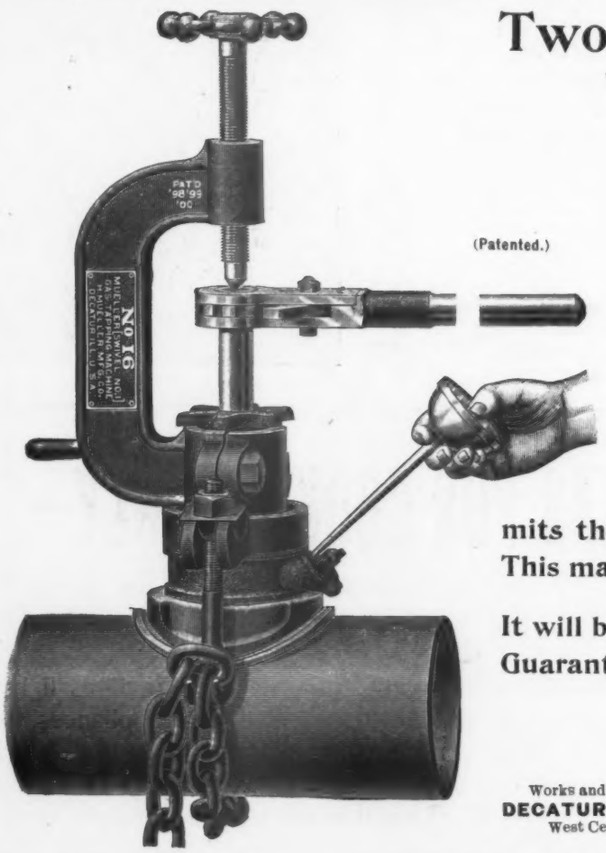

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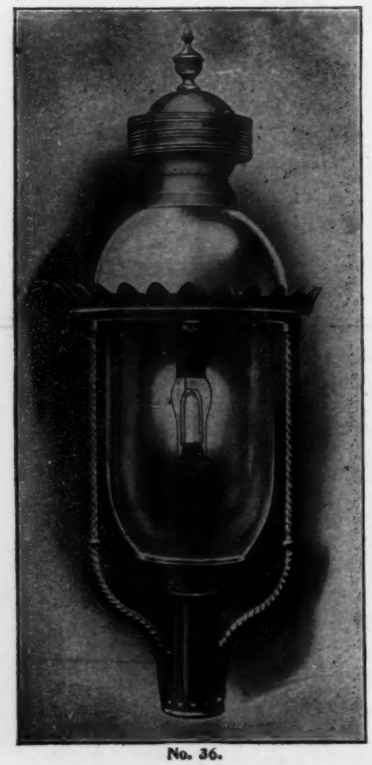

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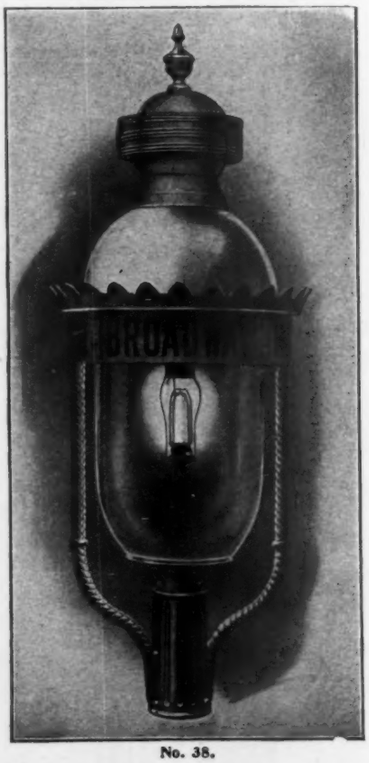

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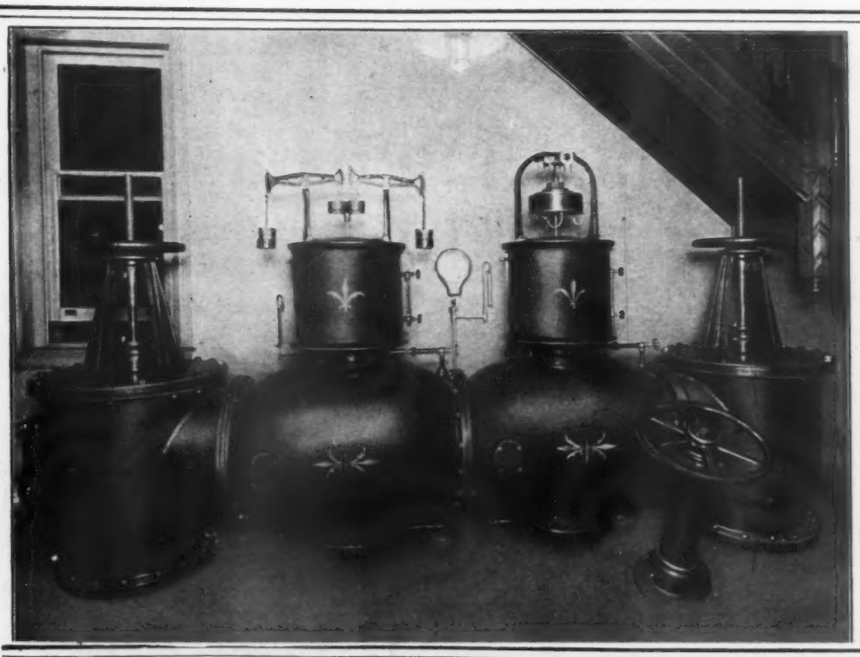

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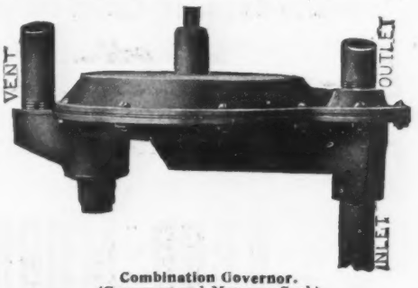

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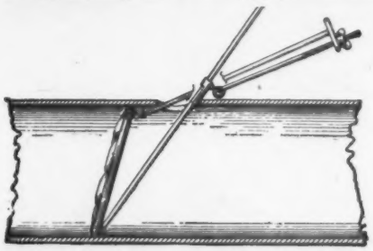

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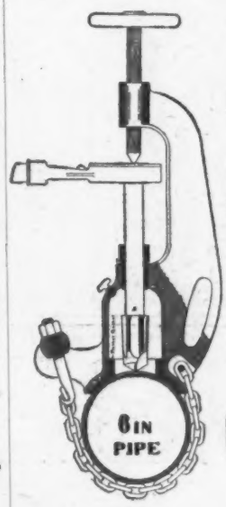

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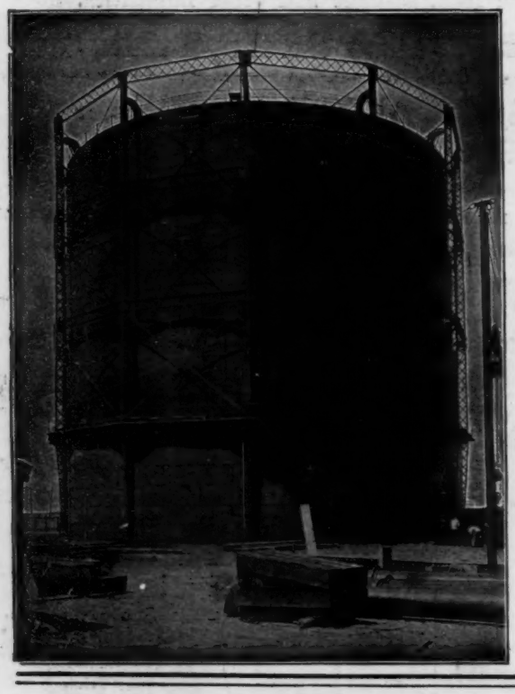

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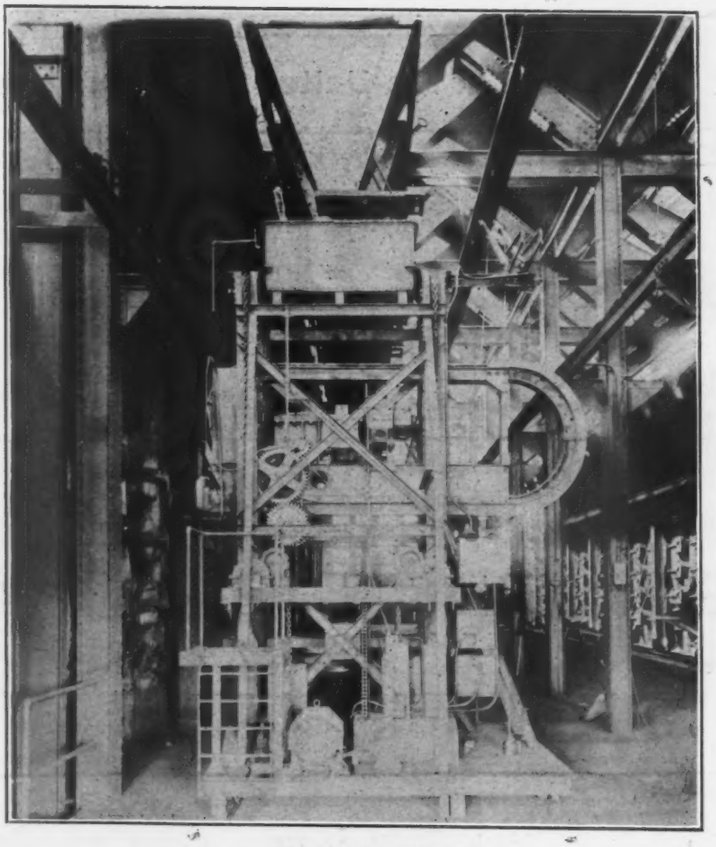

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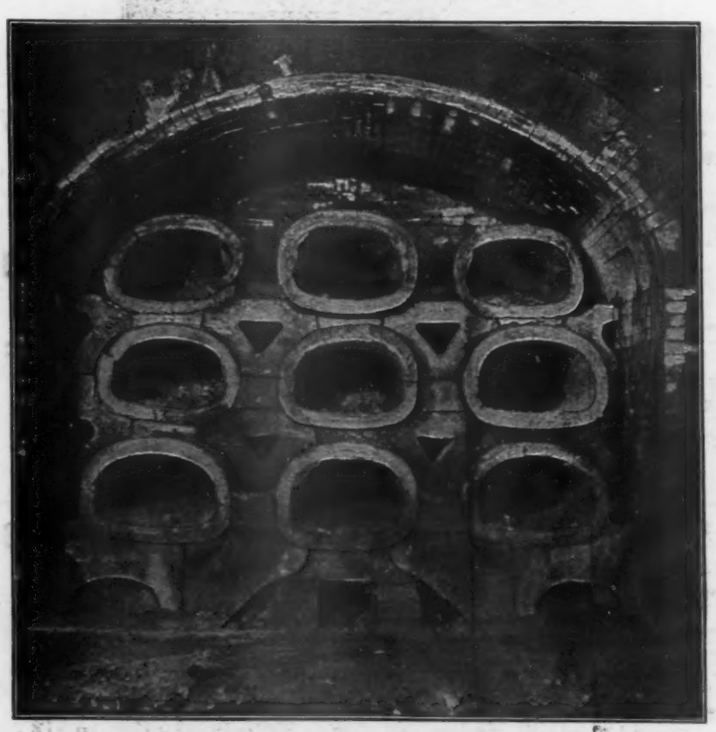

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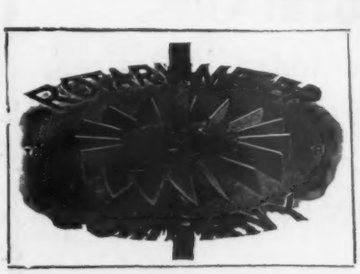

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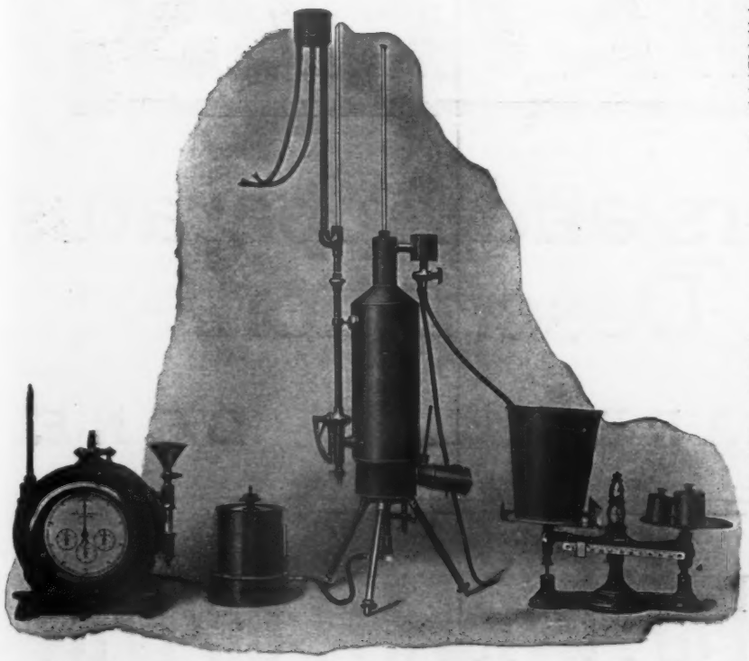

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